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WITH ABSTRACT OF THE LITERATURE

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(*Concluded*)

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THE JOURNAL OF INDUSTRIAL HYGIENE

VOLUME XII DECEMBER, 1930 NUMBER 10

THE EFFECTS OF LEAD ON THE VISION: A CASE OF SUBHYALOID HEMORRHAGE*

FRANK G. PEDLEY, M.D., DR. P.H.

From the Industrial Clinic, Montreal General Hospital

THE incidence of eye affections in lead poisoning appears to vary considerably in the experience of different authors. Tanquerel des Planches (quoted in (1, p. 79)) saw ocular lesions very seldom in his wide experience, and most of the cases that he did see were associated with encephalopathy. Gwyn (2), writing in 1925, states that no case of optic neuritis or optic atrophy due to lead had been recorded in the Toronto General Hospital in the preceding ten years. Norris, according to Brose (3), found among 15,000 eye cases only three of lead amblyopia. On the other hand, Prendergast (4) saw it frequently among the Staffordshire potters. His experience in this connection is shown in the following figures:

	170 Males with Lead Poisoning	*235 Females with Lead Poisoning*
Totally blind.....	4	18
Partially blind.....	6	24
Disturbed vision.....	17	33

*Received for publication Aug. 1, 1930.

J. L. Gibson (5) of Australia, who seems to have seen more eye affections from lead than anyone else, had under his care in the Brisbane Hospital for Sick Children fifty-four cases of optic neuritis among 200 children poisoned by lead. Gibson is an oculist and has interested himself particularly in the action of lead on the eye; this may explain the large number of cases from his clinic. In contrast to the 200 children under Gibson's care is a group of 200 cases of cancer treated by Blair Bell and his associates (6) with heroic doses of colloidal lead. In this group only four complained of eye symptoms. Two of these had temporary loss of vision; the eye involvement of the other two was associated with general edema and albuminuria. A very excellent review of the literature on this subject may be found in Alice Hamilton's "Industrial Poisons in the United States" (1).

To the cases of eye involvement in lead poisoning reported in the literature, I wish to add five which I have seen in the past four years among 100 cases of lead poisoning and lead

absorption. It should be made clear at the outset that persons without evidence of lead poisoning develop obscure eye disorders, and it does not follow, therefore, that an eye condition in a case of lead poisoning is necessarily due to the lead.

One of my cases with optic atrophy was in a color mixer in a lithographing plant, who was exposed to lead chromate and other lead salts. He suffered from congenital cataracts in both eyes and the atrophy was only discovered following the removal of one of the lenses. Lead was recovered from his urine, and several oculists expressed the opinion that the atrophy was due to lead; nevertheless, it has always been a matter of considerable doubt in my own mind. The second case of optic atrophy was in a painter. It was thought at first to be due to syphilis, and potassium iodide was administered. Under this treatment the eye condition became worse and the spinal cord became involved in an ascending transverse myelitis which ultimately resulted in death. In this case lead was recovered from the spinal fluid and from the brain substance, and this was thought to establish the diagnosis of lead poisoning. A third case was one of neuroretinitis which I saw only casually. This man showed evidence of lead poisoning in the occurrence of stippling of the red blood cells, but his neuroretinitis was, in all probability, brought on by kidney failure. Whether this in turn was caused by chronic plumbism is open to question. A fourth case was that of an amblyopia in a solder and babbitt molder. It was presumed that this was due to lead since lead was found in his urine, but tobacco complicated the picture. The patient improved on his return to work, in spite of the fact that he continued to show very definite signs of lead absorption. His ocular signs were always negative and it was thought that the lesion in this case was a retrobulbar neuritis. The fifth case was one of subhyaloid hemorrhage, which I propose to describe in some detail later.

The relationship of lead to ocular disturbances is somewhat vague in the minds of most internists and oculists. There are those who appear to believe that amblyopia is a manifestation of encephalopathy, but this does not seem to be the case very often. Certain persons develop eye lesions with comparatively slight exposure to lead, and with few other symptoms; this does not, however, necessarily exclude lead as the cause, for in other plumbic nerve lesions, such as wrist drop, the patient may have no other symptoms whatever. de Schweinitz (7) classifies the effects of lead on the retina as follows:

1. Transient amblyopia, without ophthalmoscopic change, due to an anaesthetic effect of the lead on the retina and optic nerve (Thomas Oliver), and not unlike amaurosis from uraemia without fundus-lesions.

2. Permanent amblyopia, without distinct fundus-changes, or, at most, some hyperaemia of the nerve-tip and undue filling of the retinal circulation, due to a retrobulbar neuritis, analogous to that occurring under the influence of other toxic agents. This type may terminate in blindness from optic-nerve atrophy.

3. Optic neuritis, or neuroretinitis, either specifically due to the lead, or secondary to changes in the brain or kidneys.

4. Optic-nerve atrophy, either consecutive to a plumbic papillitis or due to the primary effect of the lead on the visual apparatus.

5. Various types of retinitis, often due to

lead-nephritis, but also primary and appearing in the form of vasculitis and perivasculitis.

Another convenient classification of the effect of lead on the visual tract is to consider it as operating:

1. By direct action on the optic nerve and the retina.
2. By direct action on the extrinsic muscles of the eye or on the nerves supplying them.
3. By direct action on the visual centers in the brain.
4. By indirect action through injury to the renal or the vascular system.

According to Alexander (8), ophthalmic findings may be negative in 10 per cent. of the cases of lead amblyopia, in 11 per cent. there may be hyperemia of the disk, in 30 per cent. a papillitis, in 8 per cent. a choked disk, in 12 per cent. neuroretinitis, and in 29 per cent. atrophy.

Paralysis of the extrinsic muscles of the eye has been reported by Brose (3), Gibson (5), and others. Gibson's cases nearly all had paralysis of one or both external recti, but the condition is apparently quite rare in the experience of most observers.

Central action on the visual centers occurs in cases of encephalopathy, and may result in hemianopia, scotomas, and other bizarre effects. The literature on this type of action has been reviewed by Williams (9).

The eye lesions which are secondary to kidney involvement differ in no essential particular from the eye lesions of kidney failure due to other causes.

The prognosis of eye disorders in lead poisoning is usually good. Sometimes the duration of the disability is only a matter of hours and it is quite possible that many slight effects go unrecognized by the patients themselves. It must be borne in mind, however, that in some cases blindness is permanent. A guarded prognosis should always be given.

In the treatment of eye disorders from lead a certain amount of care must be exercised. Potassium iodide in the early stages probably does harm by mobilizing into the blood stream the lead stored in the bones. Some weeks after the onset, if the patient has been removed from exposure, potassium iodide may be used with caution; but in the early stages a high calcium diet should be given and no other medication except what is indicated for the relief of symptoms such as colic.

I wish now to present in some detail the history of the case of subhyaloid hemorrhage mentioned above:

W. D., a male of 32 years of age, attended the Industrial Clinic at the Montreal General Hospital for treatment of lead poisoning from May 15, 1929, to June 15, 1929. The evidences of plumbism on this occasion were abdominal pain, blue line, stippling of the red cells, anemia, and lead in the urine. He was a babbitter of bronze bearings by trade, and was exposed to lead not only from the babbitt but also from the bronze (10), which often contained as much as 20 per cent. of lead, and was melted and cast near his bench.

The patient was discharged as ready for work on June 15, 1929, and he carried on quite satisfactorily until Jan. 20, 1930. In the evening of that day, while reading a newspaper, he noticed a severe pain over the left eye, but no involvement of vision. The next morning when he awoke, he was quite blind in the left eye. He reported to me about an hour later. In May, 1929, the vision in the left eye had been 20/30 by Snellen's card; now he could distinguish nothing centrally, although he was able to perceive a little on the extreme temporal side of his visual field. Ophthalmoscopic examination revealed a large effusion of

absorption. It should be made clear at the outset that persons without evidence of lead poisoning develop obscure eye disorders, and it does not follow, therefore, that an eye condition in a case of lead poisoning is necessarily due to the lead.

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blood extending upward and outward in a fan-shaped manner from the disk. A few minutes after the first examination a second hemorrhage appeared, extending downward and inward from the disk. The picture, according to Dr. Mathewson and Dr. Ramsey of the Eye Department, was typical of subhyaloid hemorrhage. The patient was admitted to the medical ward and kept under observation for nearly a month. During that time the diagnosis of lead absorption was amply confirmed by blood and urine examinations and by the blue line in his gums. At the time of his admission the patient complained only of his eye, but later he mentioned symptoms of mild abdominal pain and constipation.

The last time the patient was seen was on July 29, 1930, six and one-half months after the occurrence of the hemorrhages. At this time the fundus oculi was practically normal. A few spots of brownish pigmentation were the only marks of the hemorrhages. Vision was 20/30 in the eye by Snellen's card. This happy termination occurred in spite of the fact that the patient had returned to work and still showed evidence of lead absorption. At no time during his disability was the right eye affected.

We were called upon to render a decision as to whether or not this subhyaloid hemorrhage was due to lead. A search of the literature gave no help. The causes of subhyaloid hemorrhage, according to de Schweinitz (11), are legion; this makes one suspect that the real cause has not been discovered Gibson (5), who has probably had the widest experience in the ocular effects of lead, states, "There are seldom hemorrhages, and never large ones." Elsner (12), Gowers (13), and Oliver (14) mention hemorrhages, but do not describe them, and one gets the impression that they are referring to the later stages of lead poisoning with kidney involvement. The patient, W.D., showed some arterial thickening, but his blood pressure was normal and renal function tests were practically negative.

In view of the fact that subhyaloid hemorrhages occur in persons who have had no lead exposure, it is only reasonable to suppose that occasionally a man afflicted with lead poisoning would fortuitously suffer such a hemorrhage. On the other hand, since both lead poisoning and subhyaloid hemorrhage are rather rare conditions, the probability statistically of their having a causal relationship is very strong. For this reason in reply to the question "Was the subhyaloid hemorrhage an effect of lead?" the answer was "Yes, probably." However, this answer was not necessarily the correct one, and, as in all cases of odd diseases which are attributed to industrial conditions, the best one can do is to decide what is the most probable cause and give the patient the benefit of the doubt.

Summary

The literature of the effects of lead on the vision has been reviewed.

Five leaded cases with eye disorders are referred to. Two of these were cases of optic atrophy, one was a case of neuroretinitis, one of probable retrobulbar neuritis, and one of subhyaloid hemorrhage. The last case is described in detail.

Mere association of two disorders is no proof of a causal relationship. In none of the cases reported is there positive proof that lead was the agent responsible for the eye lesions.

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HISTOPATHOLOGY OF DIFFERENT TYPES OF ELECTRIC SHOCK ON MAMMALIAN BRAINS

(*Concluded*)

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AND
STANLEY COBB, M.D.

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ELECTRICITY

In the following discussion of the oscillograms and the electrical measurements pertaining to them, it must be understood that they represent typical cases and that the electrical values for other shocks may have differed from those measured. Such differences could be caused by nonuniformity in resistance of the animals or in the contact resistance in making connections with them. The results given do, however, represent typical conditions and it is not probable that the other shocks differed much from them.

The oscillogram in Figure 15 shows the start of a shock from the spark coil passed through guinea-pig 0–1 with occiput and nose contact. The calibration current was 0.025 ampere, which was approximately the root-mean-square value of the spark coil current. No additional data were taken regarding this film as it was intended to show only the phenomena at the start of a shock by this particular current.

The oscillograms in Figures 16 and 17 may well be considered together. Figure 16 shows a spark coil shock on guinea-pig 0–1, with occiput and nose contact, and Figure 17 shows the spark coil current when passed through a noninductive resistance of 1,640 ohms. The value of this resistance was so chosen that the height of the current wave duplicated that of the current through guinea-pig 0–1. This indicates that the resistance of pig 0–1 under these particular conditions was 1,640 ohms. This was also indicated by the agreement of the root-mean-square currents as measured. The resistance of the animal under these conditions and the root-mean-square current being known, it is possible to make the following calculations which are approximately correct:

$$\text{watts} = I^2R = 0.0255^2 \times 1{,}640 = 1.07$$

$$\text{r.m.s. volts} = IR = 0.0255 \times 1{,}640 = 42$$

$$\text{calories per minute} = \frac{1.07 \times 60}{4.18} = 15.3$$

The fact that the current had the same wave shape when passed through the noninductive resistance as when passed through the animal, indicates that the animal was pure resistance, *i.e.*, had neither inductance nor capac-

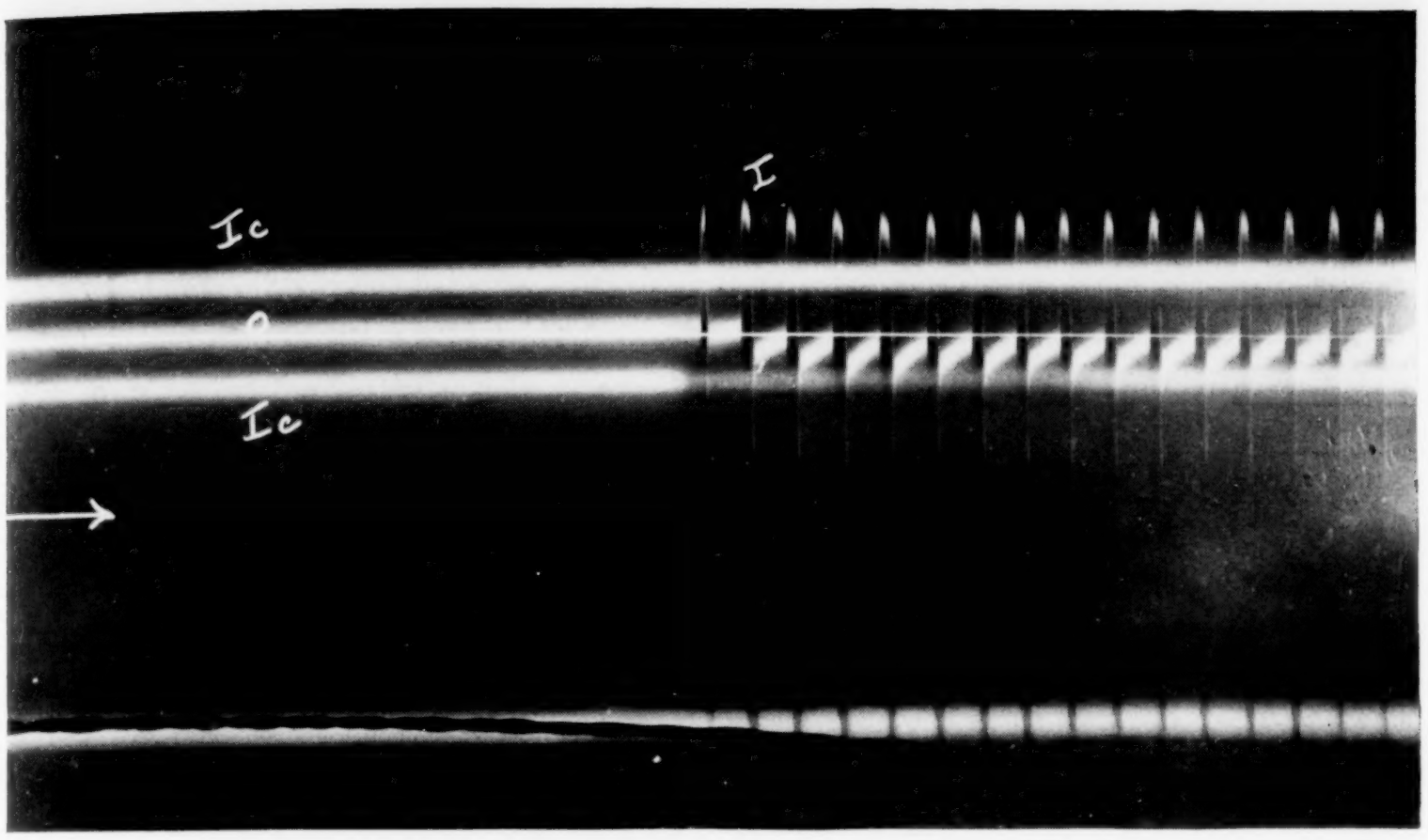

FIG. 15.—Spark coil current. Nov. 7, 1929. Guinea-pig 0–1; occiput and nose contact. Initial shock. Calibration amperes 0.025.
I = current; Ic = calibrating current.

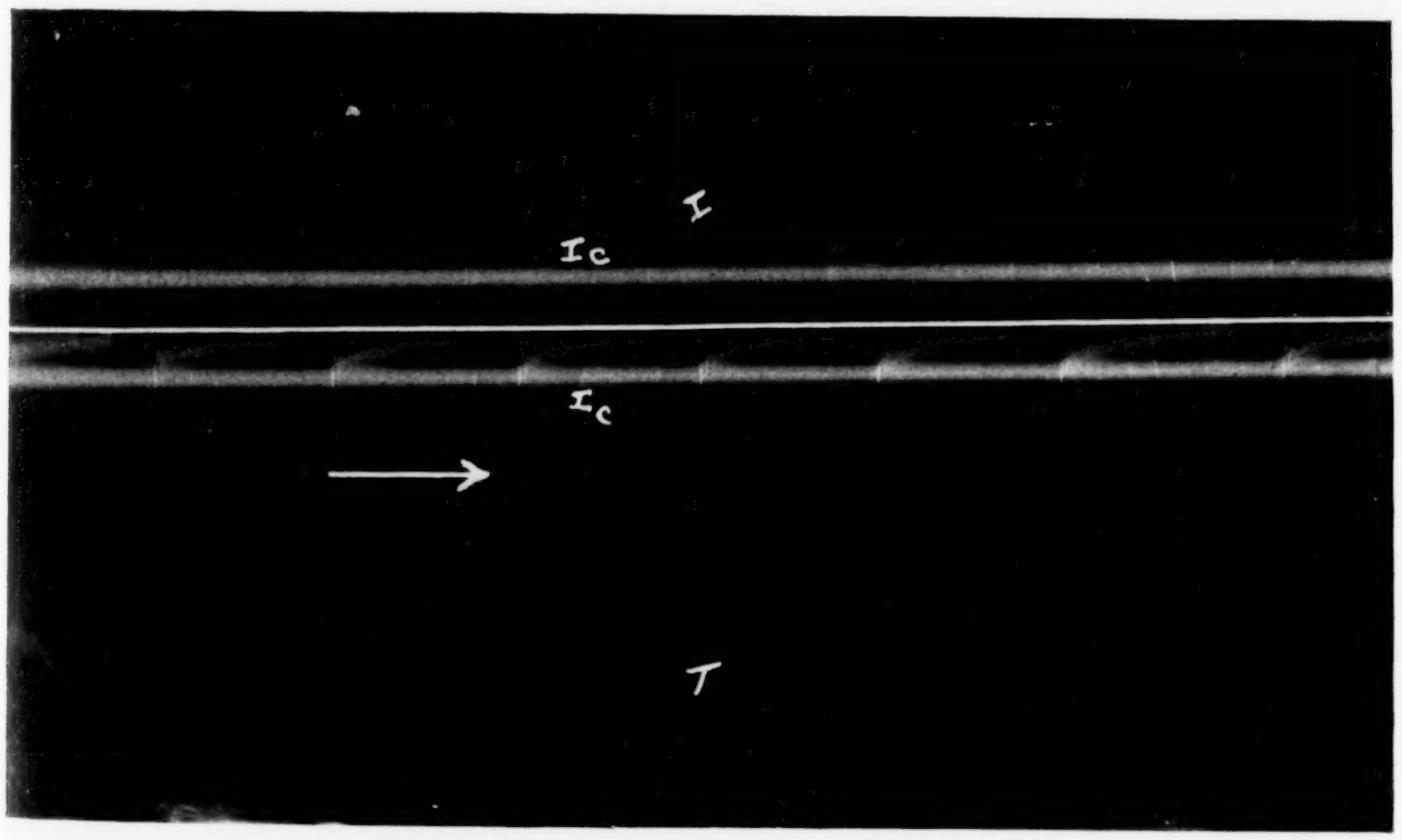

FIG. 16.—Spark coil current. Nov. 5, 1929. Guinea-pig 0–1; occiput and nose contact. Root-mean-square amperes 0.0255; calibration amperes 0.025. Timing frequency 62 cycles.
T = timing wave.

ity. This is clearly demonstrated in the discussion of Figure 22. Because the animal was pure resistance, the voltage had the same wave shape and was in phase with the current, and the following assumptions may therefore be made: The ratio between the known calibration current and the maximum current at the instant the contacts close, measured from the film, is 11 : 24. The calibration current was 0.025 ampere, and the maximum current may be computed thus:

$$11 : 24 = 0.025 : \text{I maximum}$$
$$\text{I maximum} = 0.055$$

Since the calibration amperes were approximately the same as the root-mean-square amperes and the current and voltage waves were the same shape, the ratio between the root-mean-square voltage and the maximum voltage is 11 : 24. The computed root-mean-square voltage was 42; therefore the maximum voltage was 92. Similarly, computing for the maximum voltage of the oscillation at the instant the contacts broke, the number 130 is obtained. It should be noted that the voltage change, at the instant the contacts broke, was the sum of these voltages, or 222 volts.

The oscillogram in Figure 18 is similar to that in Figure 16 but the contact to the animal was occiput and right hind leg. Under this condition the animal's respiration stopped but it was started again by artificial means.

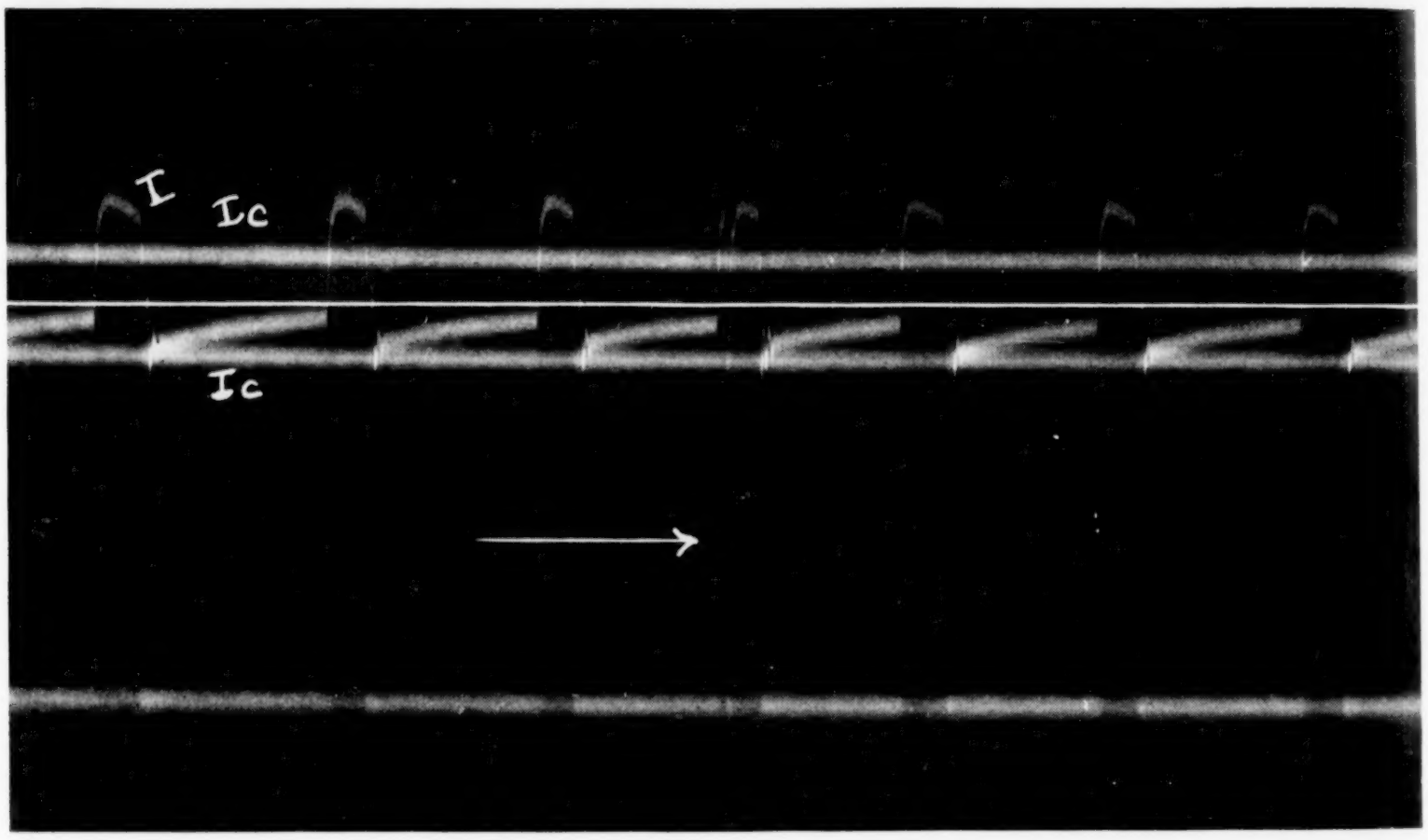

FIG. 17.—Spark coil current. Nov. 5, 1929. Noninductive resistance 1,640 ohms. Root-mean-square amperes 0.0255; calibration amperes 0.025.

Figure 19 shows the start of the condenser discharge current passed through guinea-pig 0–2, with occiput and nose contact, and Figure 20, a similar shock after electrical conditions had become constant. Figure 21

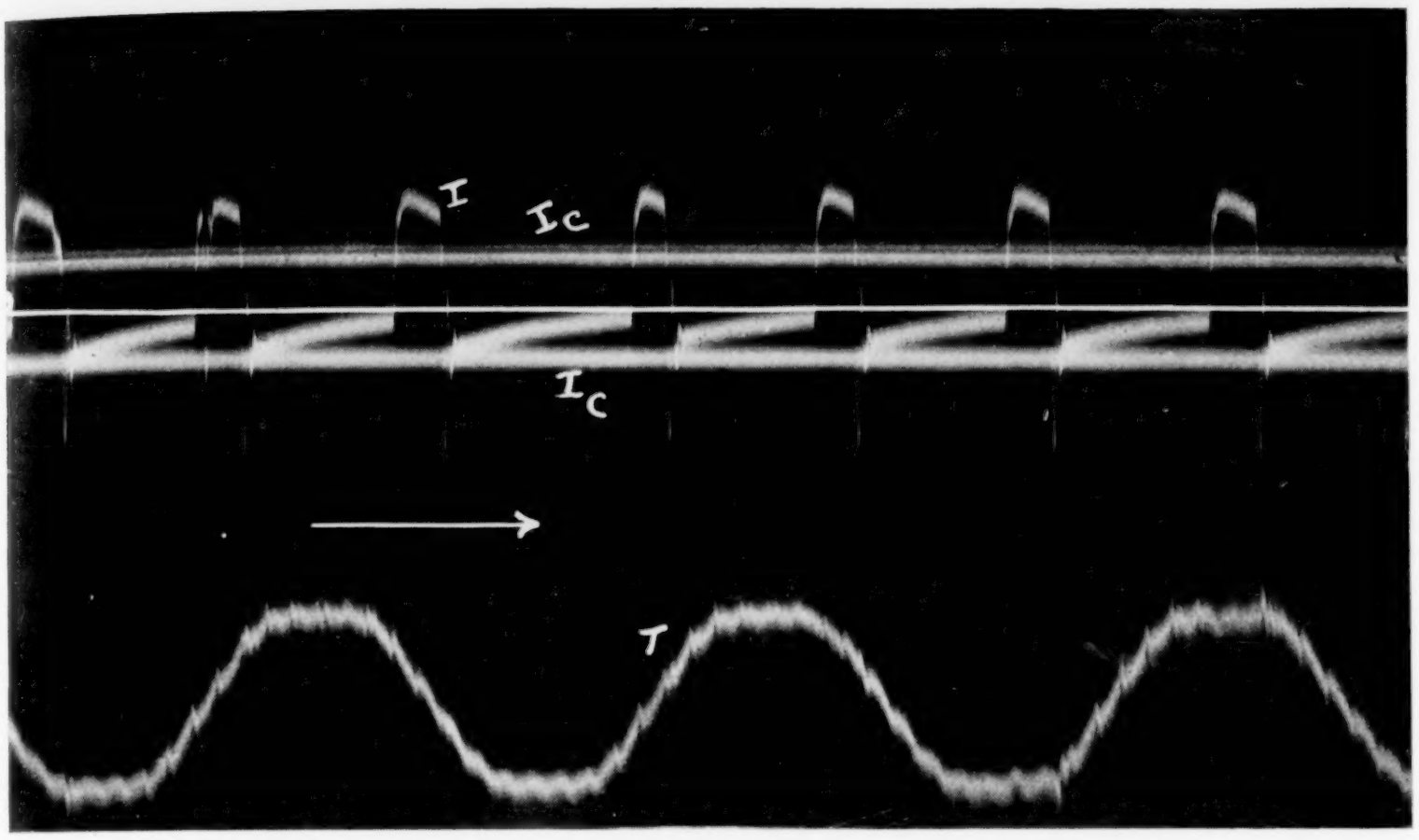

FIG. 18.—Spark coil current. Nov. 5, 1929. Guinea-pig 0–1; occiput and right hind leg contact. Root-mean-square amperes 0.0255; calibration amperes 0.025. Timing frequency 62 cycles.

Note.—Respiration stopped but was started again by artificial means.

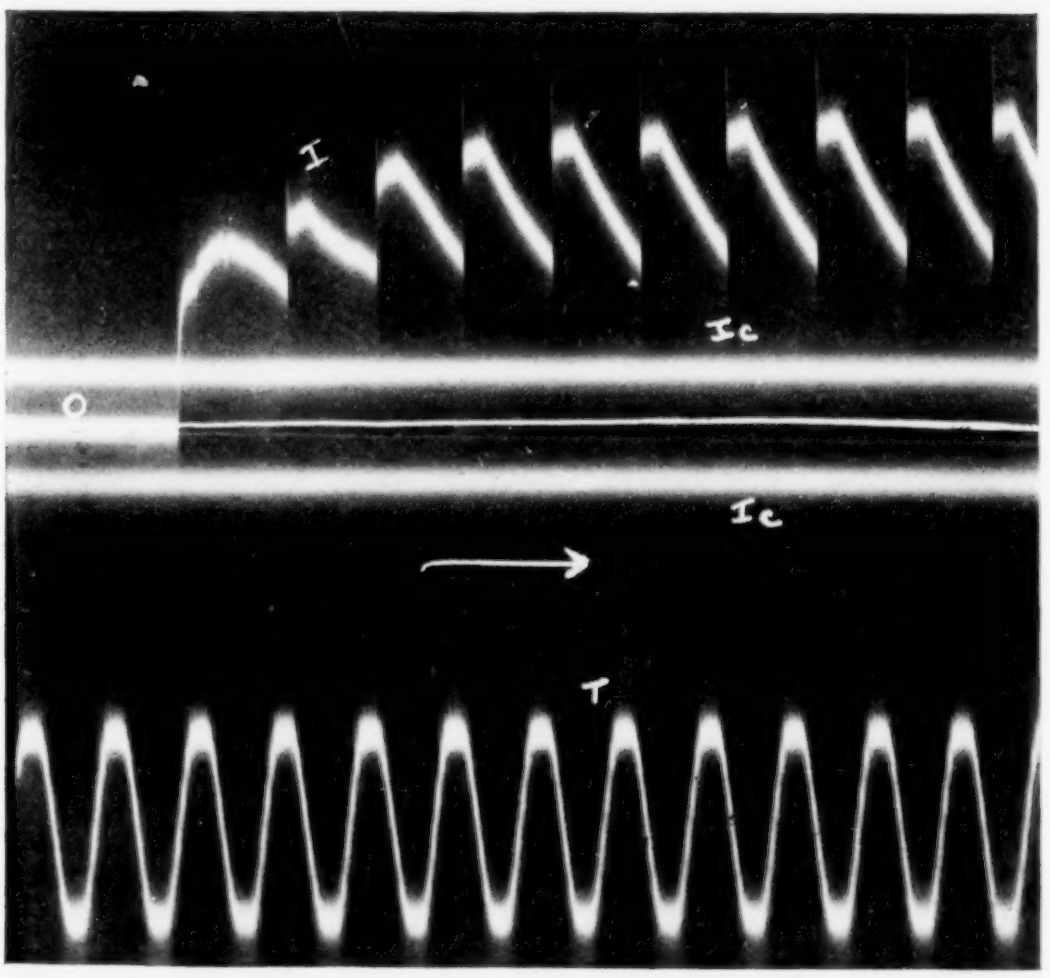

FIG. 19.—Condenser discharge current. Nov. 6, 1929. Guinea-pig 0–2; occiput and nose contact. Initial shock. Calibration amperes 0.025. Timing frequency 60 cycles.

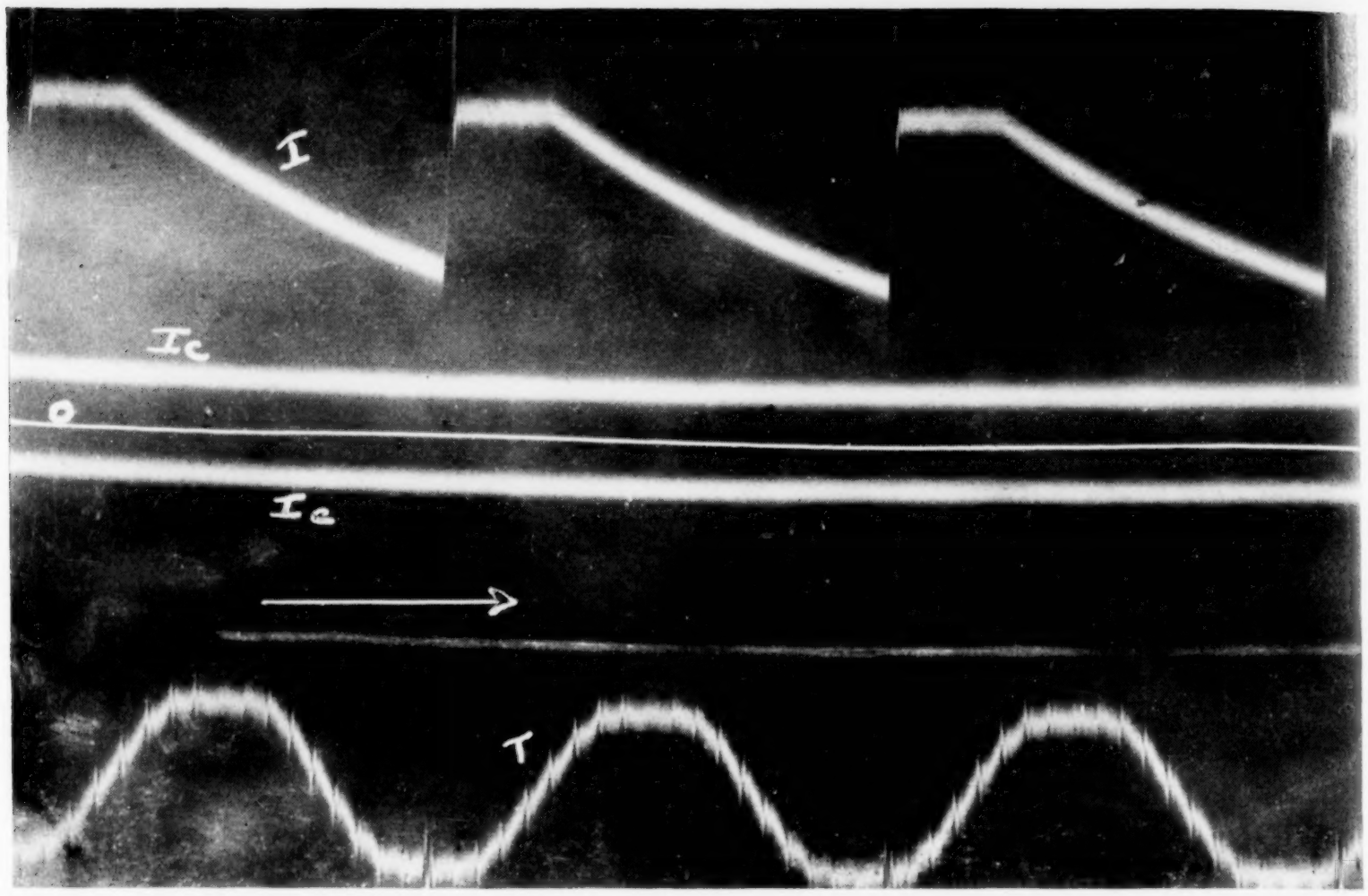

FIG. 20.—Condenser discharge current. Nov. 6, 1929. Guinea-pig 0–2; occiput and nose contact. Root-mean-square amperes 0.114; calibration amperes 0.025. Timing frequency 59 cycles.

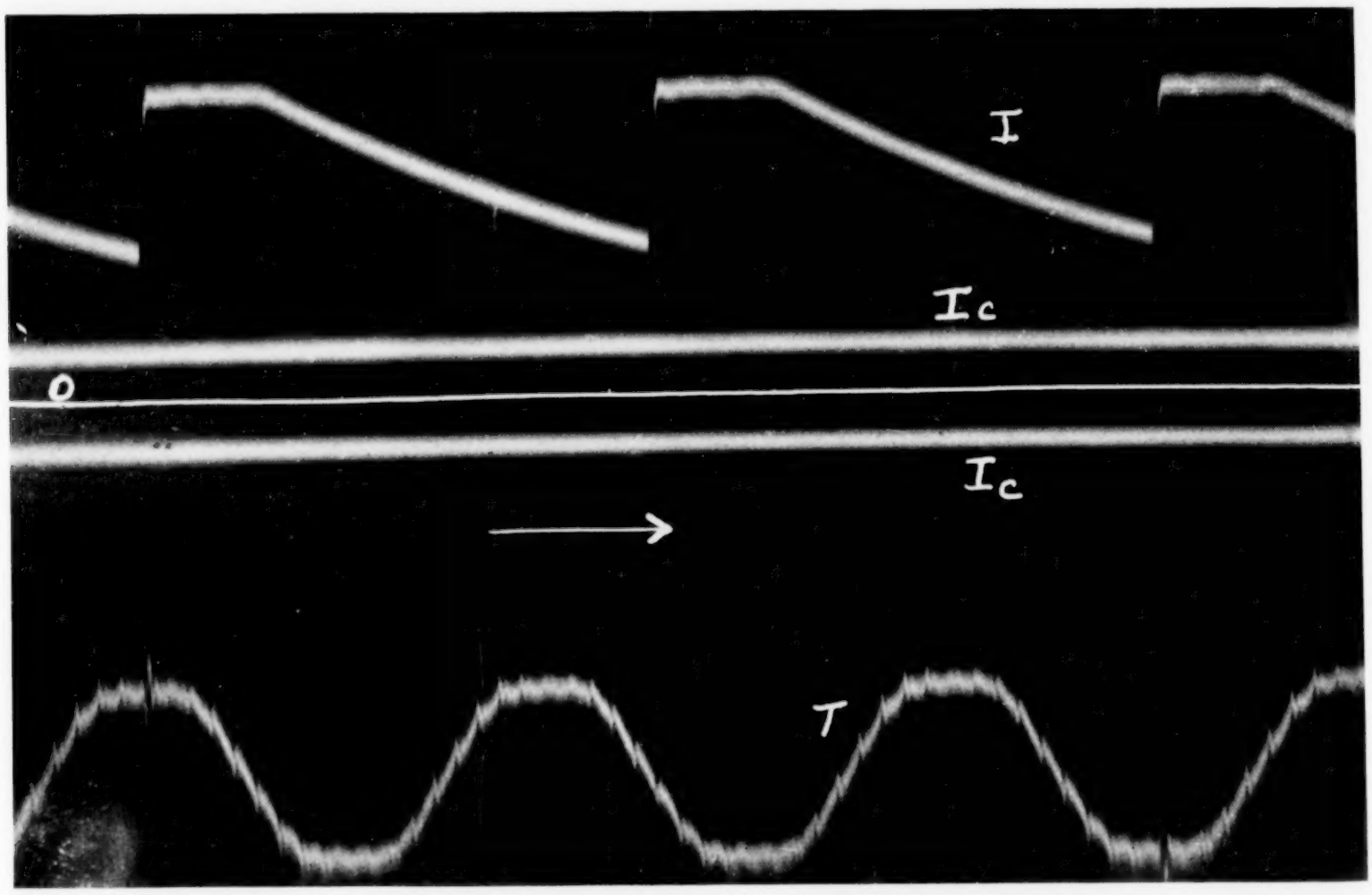

FIG. 21.—Condenser discharge current. Nov. 7, 1929. Noninductive resistance 767 ohms. Root-mean-square amperes 0.114; calibration amperes 0.025. Timing frequency 63 cycles.

shows the condenser discharge current passed through a noninductive resistance of 767 ohms. The root-mean-square current measured for both Figures 20 and 21 was 0.114 ampere. From these values the following calculations may be made:

$$\text{watts} = I^2R = 0.114^2 \times 767 = 9.92$$

$$\text{r.m.s. volts} = IR = 0.114 \times 767 = 87.5$$

$$\text{calories per minute} = \frac{9.92 \times 60}{4.18} = 142.3$$

The change can be computed by the ratio between the height at the instant of make. This ratio is 3:16 and determines the change in current as 0.136 ampere. The voltages corresponding to these currents can be calculated, on the assumption that the current and voltage wave shapes were the same, by the ratio between the root-mean-square current (0.114 ampere) and the root-mean-square voltage (87.5 volts), which is 0.114:87.5. In this way, the maximum impressed voltage is found to be 159 volts and the maximum voltage change 102 volts.

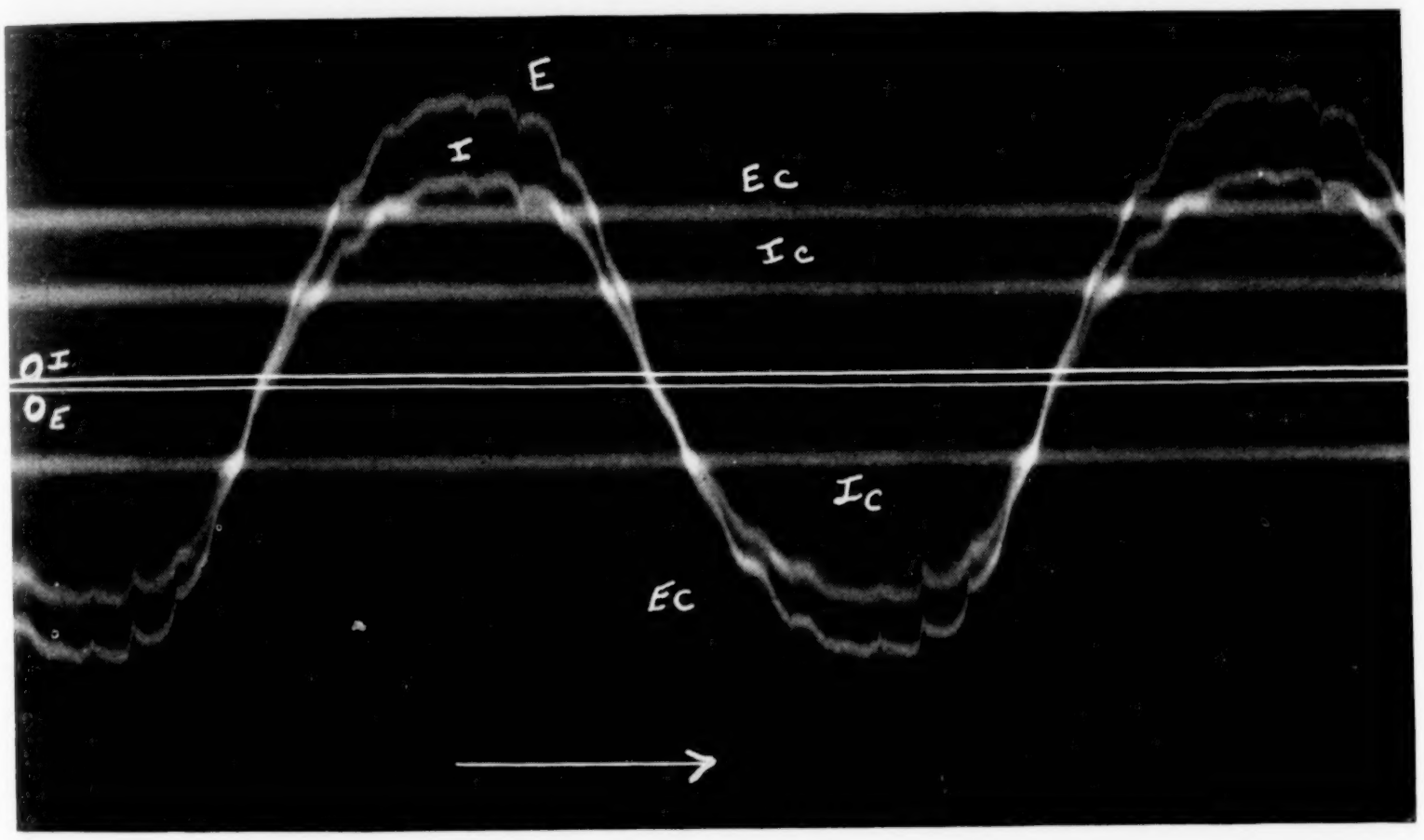

FIG. 22.—Alternating current and voltage. Guinea-pig 0-3; occiput and nose contact. Root-mean-square amperes 0.64; calibration amperes 0.39. Root-mean-square volts 150; calibration volts 135. Timing frequency 54 cycles.
E = voltage; Ec = calibrating voltage.

The maximum current can be obtained by means of the ratio between the height of the known calibration current (0.025 ampere) and the maximum height of the condenser wave, which is 3:25. This gives the maximum current as 0.208 amperes at the instant of make. The change in current value at this instant was not, however, from zero to 0.208 ampere, for the current did not start at zero.

Figure 22 shows the wave shape of the current and voltage taken from the alternating current side of the rotary converter and applied to guinea-pig 0–3, with occiput and nose contact. The power demand was sufficient to

slow the machine down to 54 cycles. It should be noted that not only were the current and the voltage in phase but the tooth harmonics occurred at the same instant in both waves. The root-mean-square current and voltage were measured and other values were calculated as follows:

$$\text{watts} = EI = 150 \times 0.64 = 96$$

$$\text{resistance} = \frac{E}{I} = \frac{150}{0.64} = 235 \text{ ohms}$$

$$\text{calories per minute} = \frac{96 \times 60}{4.18} = 1{,}377.7$$

With a sinusoidal wave the maximum values are the root-mean-square values multiplied by 1.42. Thus, the maximum current is found to be 0.905 ampere and the maximum voltage 212 volts.

Figure 23 shows the spark coil current passed through a cat, with intracranial contact. The electrical values are of the same order of magnitude as those represented by the oscillograms in Figures 16 and 17.

Figure 24 gives current and voltage values for a shock on a cat, intracranial contact, with 60 cycles alternating current. The calculations are similar to those of the oscillogram in Figure 22.

$$\text{watts} = EI = 410 \times 0.08 = 32.8$$

$$\text{resistance} = \frac{E}{I} = \frac{410}{0.08} = 5{,}125 \text{ ohms}$$

$$\text{computed I maximum} = 0.113$$

$$\text{computed E maximum} = 580$$

$$\text{calories per minute} = \frac{I^2RT}{4.18} = 470$$

The system direct current impressed on a guinea-pig, occiput and nose contact, measured by d'Arsonval instruments gave the following values. The voltage remained constant at 105 volts but the current rose rapidly. Values are given at the time the voltage was applied and at the end of a half minute:

	Start	*At End of One-half Minute*
Amperes	0.36	0.55
Watts	38	58
Resistance in ohms	293	192
Calories per minute	544.3	834.1

Heat

In ordinary accidental electric shock the resistance at the points of contact is usually high and severe electric lesions result. These lesions are the "electric markings" described by Kawamura (12), Jaffé (14), Jellinek (19) and others, together, very frequently, with third degree burns from electric sparks. It is, possibly, because of these burns that it is generally assumed that the heat is tremendous during an electric shock. Werner (3) found at autopsy, promptly after legal electrocution, that the brain temperature was about 63°C. and that the brain was steaming, indicating that it had been boiling during the passage of the current. Jaffé suspects that the vacuolization of nerve tissue is caused by heat. But the resistance met with at the points of contact between electrode and skin is tremendous compared with that beneath the skin or in other parts of the body. If the resistance of the skin is 50,000 ohms per square centimeter, mucous membrane offers a resistance of only 100 ohms (Brandau, quoted by Jaffé (14)) and the blood is the best conductor of all.

By means of the formula $\frac{I^2RT}{4.18}$, the heat produced by the various wave

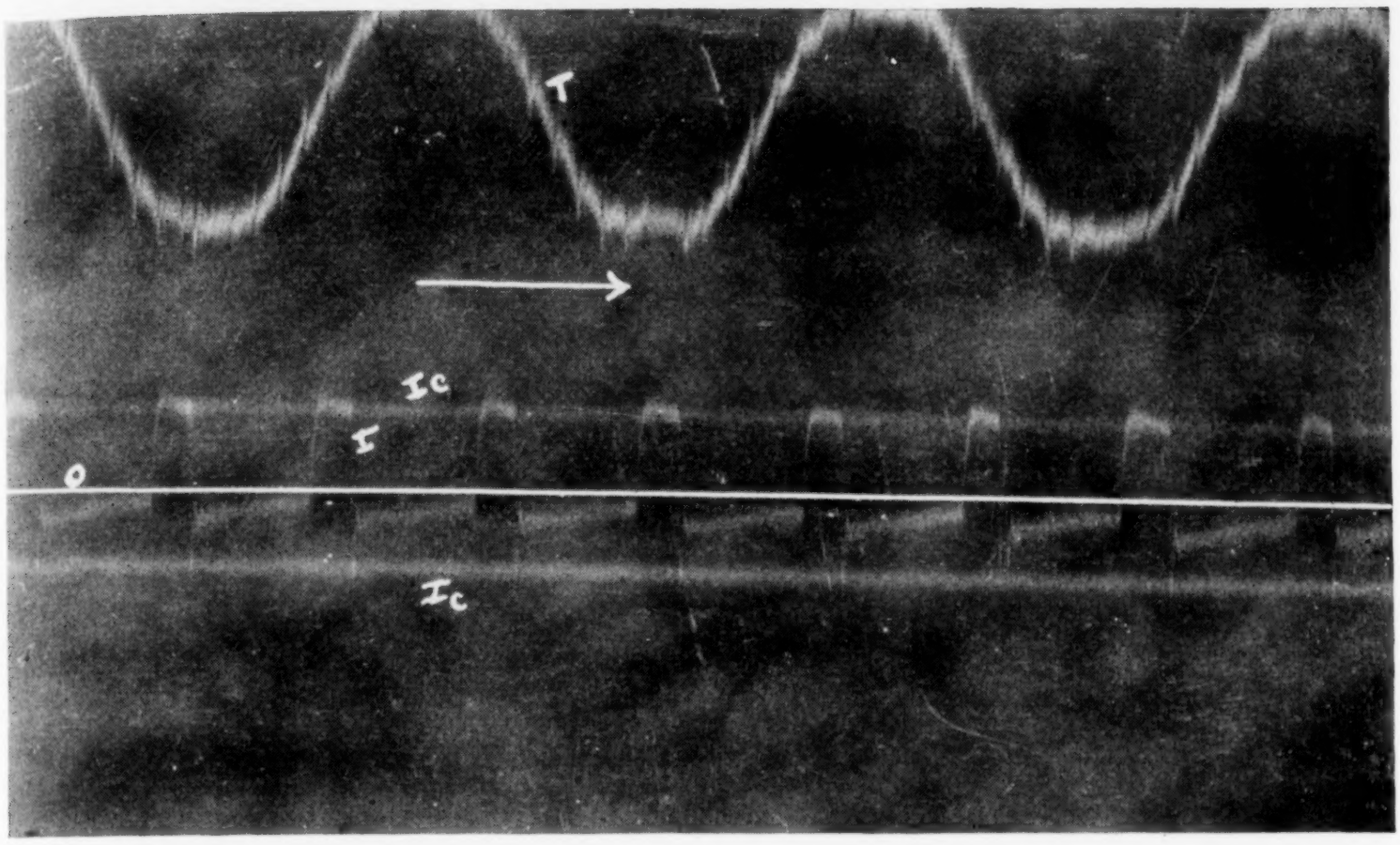

FIG. 23.—Spark coil current. Nov. 18, 1929. Cat; intracranial contact. Root-mean-square amperes 0.025; calibration amperes 0.04. Timing frequency 60 cycles.

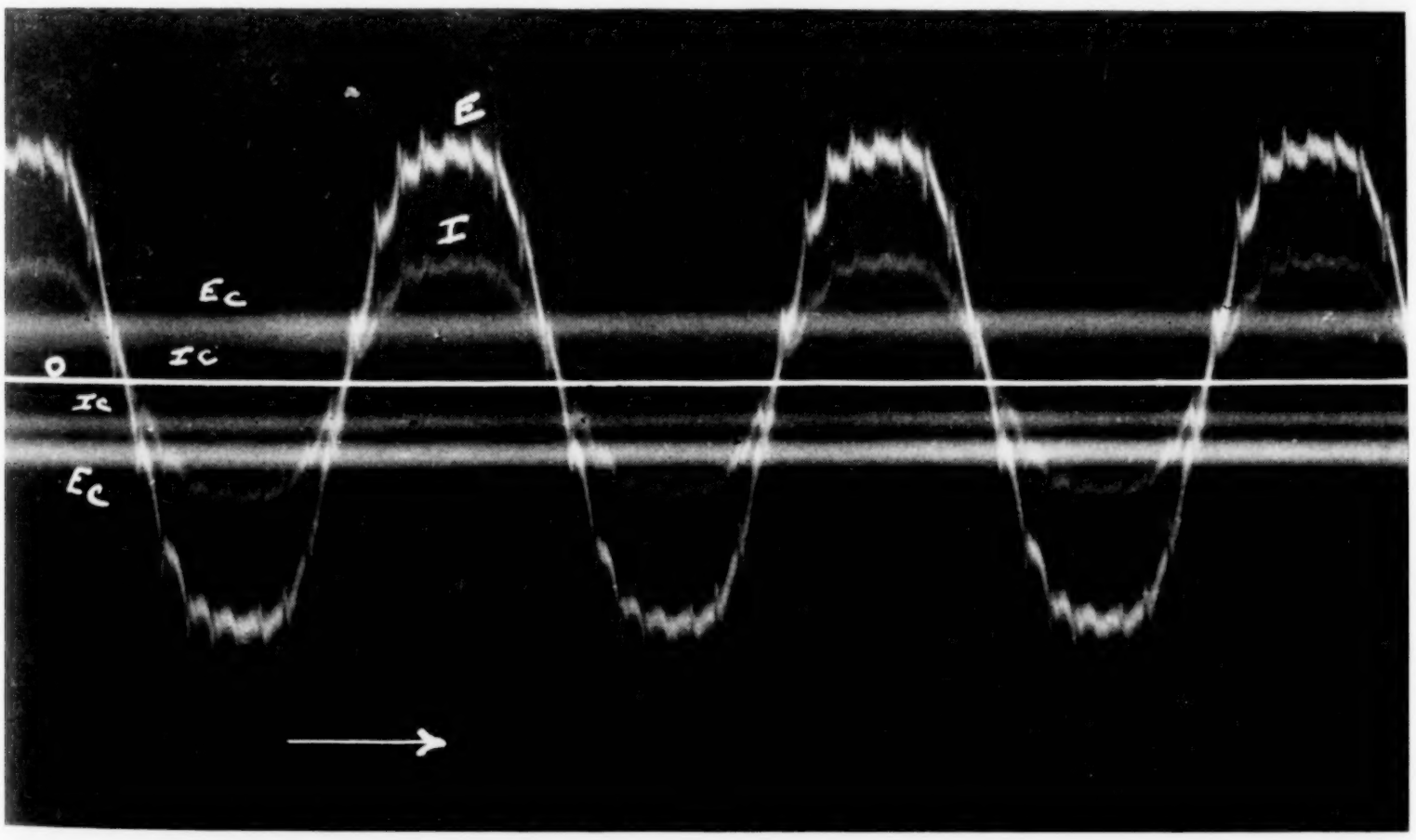

FIG. 24.—Alternating current and voltage. Cat; intracranial contact. Root-mean-square amperes 0.08; calibration amperes 0.035. Root-mean-square volts 410; calibration volts 140. Timing frequency 60 cycles.

types was computed in calories; from the figures obtained it is obvious that the actual heat passing through the body is not very great. Then by the aid of a thermocouple the intracranial temperature was measured during intracranial shocks.

Three holes were made in the skull of a cat under amytal anesthesia, one hole just to one side of the midline and the others well out on the left and right lateral aspects of the skull. Into each of the lateral holes a copper electrode, carrying a 60-cycle alternating current, was inserted, which reached well down into the brain substance but not into the ventricles. Into the middle hole was introduced a thermojunction made of fine copper and constantin wire and covered with a thin coat of celloidin. The celloidin insulated it to electricity but not to heat and this was tested before it was used. It was found that because of the fine wire (about 32 B & S) the response to heat was very fast.

A coil of wire of sufficient resistance to make 2 units on the galvanometer scale equal to 1° change in temperature (by calibration) was shunted across the terminals of the galvanometer. In this experiment the red represented the cold side and it is therefore obvious that the temperature, if it changed at all, dropped a little during the shocks. (See Table

TABLE 1.—CHANGES IN BRAIN TEMPERATURE DURING ELECTRIC SHOCK

DURATION OF SHOCK	INTENSITY	ELECTROMOTIVE FORCE	GALVANOMETER DEFLECTION[1]
min.	*amperes*	*volts*	*units*[2]
	Cat		
3	0.0.0	410	1.8 red
2	0.060	410	2.0 "
4	0.040	410	3.0 "
3	0.040	410	2.5 "
3	0.080	400	2.4 "
	Guinea-Pig No. 1		
1/2	0.040	400	3.5 red
1	0.060	400	3.0 "
2	0.080	400	4.2 "
Carotids clamped			
1/3	0.080	400	7.5 blue
1	0.080	390	16.0 " off scale
Animal died promptly			
	Guinea-Pig No. 2		
One vertebral and both carotids clamped			
3/4	0.080	400	Blue off scale

[1] Red = cold side; blue = hot side.
[2] 2 units = 1°C.

1.) No explanation is offered for this peculiar phenomenon—and it would not be mentioned if it had not occurred five times in succession—unless it be that possibly the electric discharge, in the depths of the brain substance, elevated the temperature of the supposed heat center and by raising the temperature of the heat center, lowered the temperature of the rest of the body.

The same technic was used on a guinea-pig, with the exception that the carotids were clamped during the experiment. Then the experiment was repeated on another pig. First one vertebral was tied off and then just before the shock was administrated the carotids were clamped. The results are shown in Table 1.

Alternating current was selected for this experiment, because aside from direct current, it has the greatest heat coefficient (see explanation of Fig. 22). The figures seem to indicate: (1) that there is little or no heat produced in the brain by an electric discharge of 400 volts, with 40 to 80 milliamperes of approximately 50 cycles, sine wave, alternating current, as long as the circulating blood flows through the brain; and (2) that upon the cessation of cerebral circulation the brain temperature rises at once when such a current passes through it. Binger (20) has reported similar phenomena with reference to the use of diathermy in pulmonary congestion. Since it has been seen above that the animal is pure resistance and offers neither inductance nor capacity to the passage of the current, one would not expect to find a rise in temperature in the brain, unless its circulation were cut off or unless the entire body became warmed.

Discussion

The glial increase that is so pronounced in the induction coil and condenser discharge currents is not limited to any one type of glia. Beneath the ependyma, macroglia are most conspicuous although microglia augment them. The microglia, in fact, are the most active of all; not only are they seen in conjunction with oligodendroglia as satellites in the swollen cells of the gray matter, but they are greatly increased in number and activity in the white matter. Figure 25 shows them to have swollen bodies and very often in the microglia-oil-soluble-O stain fat can be seen within these cells. This is interesting in view of the fact that they are increased in number in the white matter where the myelin is often broken down. But just as interesting is the reaction of the oligodendroglia, for aside from their neuronophagic activity they form two rather striking lesions in the white matter. The first is a perivascular proliferation of

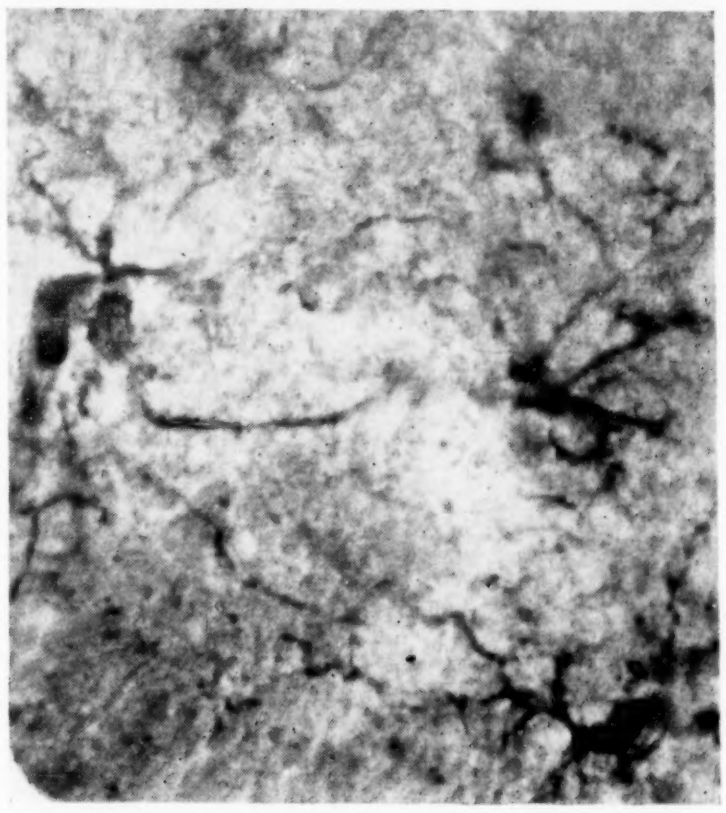

Fig. 25.—Swollen microglia (Hortega).

oligodendroglia interspersed with an occasional lymphocyte in the alternating current animals. These glia cells are normal or mildly swollen in appearance and they tend to form a light cuff about the vessel. The other lesion is the one referred to above as vacuolization. Then, of course, there is swelling of oligodendroglia (Fig. 26) which, as stated by Penfield and Cone (21), is one of the earliest types of reaction.

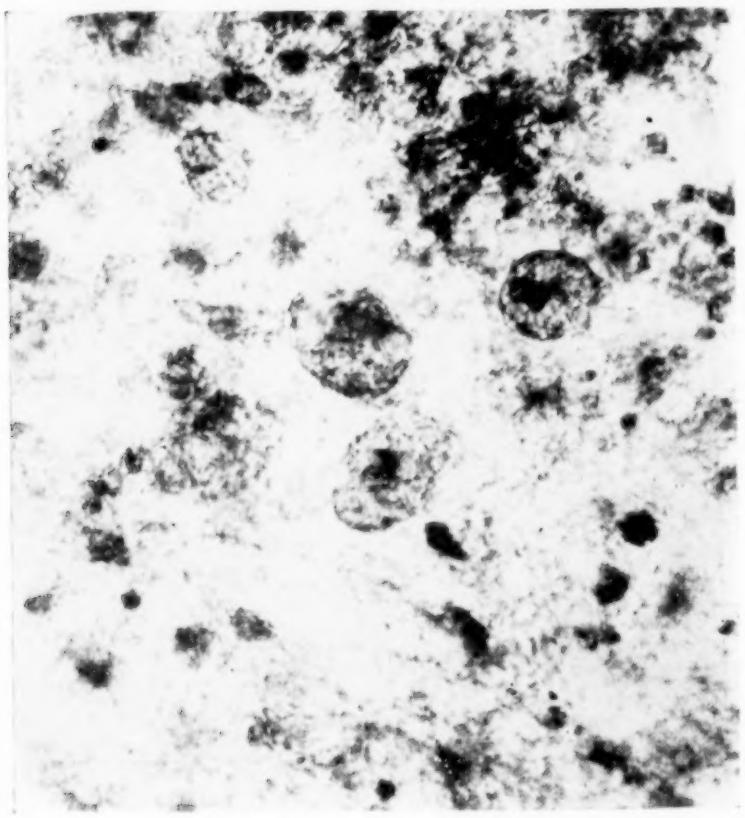

FIG. 26.—Swollen oligodendroglia (Hortega).

The white matter in the alternating current series exhibits the mesh-like appearance commonly referred to as edema. In the induction coil and condenser cases, there are vacuoles, round or lobulated, containing a basophilic coagulum which takes the mucicarmine stain. Often on the periphery of such a vacuole, or sometimes within it, there is a nucleus of an oligodendroglia cell, suggesting that the vacuole itself may be the swollen body of such a cell. It occurs so frequently that one rather favors that view. Ferraro (22) has found mucin within swollen oligodendroglia, and Bailey and Schaltenbrand (23) have maintained that the mucocytic degeneration of Grynfeltt (24) and of Pélissier (25) is probably swollen oligodendroglia. There seems to be sufficient evidence that the grape-like areas of Buscaino (26) and the mucocytic degeneration of the French authors are identical, but whether they are really mucin is a debatable point. Weil (27), in some excellent work of a histochemical nature on the preservative action of formalin on the brain, has presented enough evidence to make one seriously consider the possibility of this coagulum's being a galactolipin rather than mucin, for the mucicarmine stain is nonspecific. In the present cases frozen sections did not show any of these vacuolated lesions—a finding which agrees with Ferraro's tenet; in other sections the coagulum was basophilic in general, although in kresylecht violett the coagulum appeared pink before differentiation in 95 per cent. alcohol, and after that there was no coagulum to be seen. It would seem that the alcohol removed the color without dissolving the coagulum. Most of the authors who have reported this type of degeneration have found it only in chronic diseases; in electrocution, however, it is one of the very first lesions to appear and it must occur promptly since it can be found in the brains of victims of legal electrocution (13).

The fact that in these cases neuronophagia is usually seen in conjunction with liquefaction necrosis of the ganglion cells and is but rarely in evidence in either of the shrinkage types would

indicate that the swelling is a more advanced lesion. Whether the shrinkage is of so mild a nature that its reaction is reversible is difficult to say; it would seem to be so, since there is no, or very little, increase in satellitosis around these cells. The intensity and the frequency of shrinking of these cells are not easily determined, for normal animals vary so greatly in this respect, but in the absence of neuronophagia, the condition of the nucleus and the presence of hyperstainable, spike-like processes were taken as criteria of pathology (of chronic shrinkage type). These signs, however, were found in the earliest alternating current lesions; this agrees with the previous observations of one of us (S. C.) (18) that Spielmeyer is correct in stating that so-called chronic shrinkage may be an acute disease. The ischemic type, characterized by a pale, pyknotic perikaryon with a deeply stained nucleus and very often a hyperchromatic periphery to the cytoplasm, is truly an ischemic type and corresponds very well with the type seen in the anoxemia experiments referred to above (18).

The myelin breakdown gives evidence of having occurred along the external and internal surfaces of the brain, tractus opticus, and in the neighborhood of the ventricle, corpus callosum, and capsula interna, rather than in the direct path of the current.

The nature and action of the currents may to some extent tend to explain a few of these lesions. The actual effect of electric current upon individual nerve and glia cells and upon the medullary sheath has not been exactly determined. Davenport (quoted by Jaffé (14)) has shown that an ameba can be fragmented by an electric shock, but whether a similar effect is produced on nerve cells is not known. Hermann (28) has demonstrated that myelin migrates to the anode in a constant direct current. This work of Hermann's has been corroborated by various authors, most recently by Sato (29). In the direct current experiments of the present study the anode was attached to the nose and the cathode to the occiput, but there was no evident migration of myelin to the positive pole.

As stated above, the wave forms of the condenser discharge and induction coil currents are very similar, but they differ greatly from the alternating current wave shape; moreover, as electrical forces the condenser discharge and induction coil currents are theoretically quite different from the alternating current and they produce an entirely different electrical effect. In the first place the alternating current flows in a sine wave so that the transition from peak voltage positive to zero occurs gradually with no sudden drop, and then it goes on to peak voltage negative with the same gradual rate of change, sixty times a second. The current from the condenser is not positive at one time and negative at another, yet there is a peak voltage as well as a point of comparatively low tension in its wave. Furthermore, the transition from the crest to the nadir is very abrupt, so that the electrical stress is one of sharp impact rather than gradual and smooth electronic displacement. The same may be said of the induction coil current, except that there is a very brief instant after each break during

which the current changes from positive to negative by virtue of the condenser across the contact gap.

The frequency was probably not responsible for the differences in pathology since both induction coil and condenser discharge produced similar lesions, and the frequency of the former was 140 while that of the latter was about 55. Furthermore, the frequency of the alternating current (59 or 60) was similar to that of the condenser discharge; yet the histologic pictures differed. And of course direct current had no interruptions at all. However, since high frequency currents of thousands of cycles per second were not tried, no definite conclusions can be drawn concerning frequency.

It may be that the pathologic picture was brought about by direct action of the electric current on the nerve cells and the glia or that, reflexly, the neurologic elements were affected by the action of the current on the blood circulation. Perhaps a combination of both factors is responsible. But there are changes in the circulation that might cause pathologic alterations in the brain and, furthermore, the action of the different currents on the behavior of the cerebral blood vessels might account for some of the differences in pathology between the two chief wave shapes. The amount of heat actually produced is less than one commonly finds in fever; therefore heat can probably be ruled out as an important factor. Electrolysis has to be considered in both the condenser discharge and the direct current; since these two types show no distinctive lesions in the brain, however, no explanation is to be obtained on that basis. With regard to the mucoid degeneration's being bubbles due to electrolysis, it may be stated that Tatum (4) passed 0.4 ampere from the head to the thigh of a dog, and kept the current flowing one hour and forty minutes, although rigor mortis was present at the end of forty-five minutes, and no bubbles were found in any of the organs of the body.

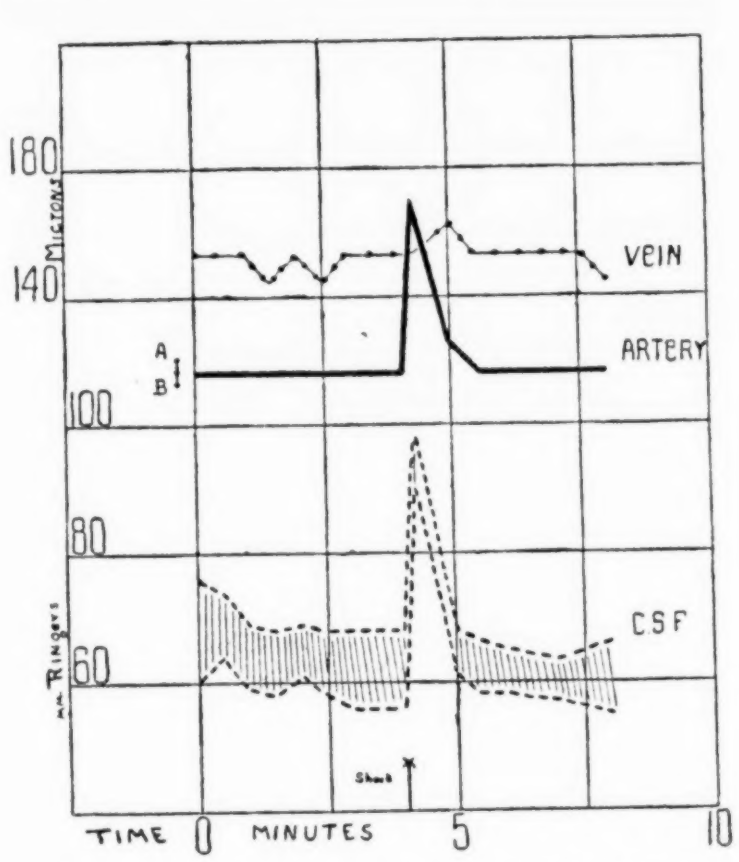

FIG. 27.—Typical induction coil shock.

In order to obtain data on the condition of the cerebral vessels during and after the shock, two experiments were performed with Dr. Forbes' apparatus. A cat was anesthetized with amytal and a window was inserted in the skull after the technic of Forbes (30), and a manometer needle was put into the cisterna magna. It was observed that during a discharge of the induction coil, with one electrode on the skull and the other on the leg, the arteries of the pia expanded extensively, sometimes to twice their former diameter, and that the intra-

cranial pressure rose from 58 mm. to 98 mm. of Ringer's solution. This vasodilatation might well predispose tissues to edema, and it is in such cases that liquefaction of the ganglion cells, with perivascular spaces and swollen oligodendroglia, is most noticeable. (See Fig. 27 and protocol.)

PROTOCOL OF TYPICAL INDUCTION COIL SHOCK

The following figures show how a base line was established by frequent micrometer readings of the diameters of the artery and vein and by the cisternal pressure readings in millimeters of Ringer's solution.

TIME	DIAMETER OF		CISTERNAL PRESSURE
	Vein	Artery	
	units[1]	*units*[1]	*mm. Ringer's*
12:04	$8\frac{1}{2}$	$6\frac{1}{2}$	59–69
12:04½	8	$6\frac{1}{2}$	58–68
12:05	$8\frac{1}{2}$	$6\frac{1}{2}$	61–69
12:05½	8	$6\frac{1}{2}$	58–68
12:06	$8\frac{1}{2}$	$6\frac{1}{2}$	56–68
12:07	Shock		
12:07¼	$8\frac{1}{2}$	$9\frac{1}{2}$	90–98
12:08	9	7	61–68
12:08½	$8\frac{1}{2}$	$6\frac{1}{2}$	58–66
12:09	$8\frac{1}{2}$	$6\frac{1}{2}$	58–65
12:10	$8\frac{1}{2}$	$6\frac{1}{2}$	57–63
12:10½	8	$6\frac{1}{2}$	55–66

[1] There were 18 microns in 1 ocular unit.

When the shock was administered, both the artery and the vein distended and the cisternal pressure rose considerably.

With the alternating current the same window experiment was performed on another cat. It was observed that the intracranial arteries contracted during the shock and for a short time following the cessation of electrical stimulation. During the period of constriction the blood flow was so sluggish that it could be seen in the arteries and appeared a deep purple. During this period of shock the respirations ceased, and the arterial blood pressure remained constant, but the intracranial pressure dropped considerably and the fluid in the cistern manometer showed no respiratory nor pulse excursions. When the contact was broken, respirations and pulse began, and in a few seconds—fifteen to forty-five—the arteries dilated to beyond normal size, the blood became brilliantly scarlet, and the intracranial pressure rose to great heights (see Fig. 28). The phenomena in this experiment were not so clear cut as those in the induction coil experiment; nevertheless the tendency toward a fall in intracranial pressure and the contraction of the artery after each shock were constant findings.

Such a constriction of blood vessels, together with diminished blood flow, obviously diminishes the oxygen supply to the brain and the sudden dilatation of the arteries, the brilliant red color of the blood, and the rapid rate of flow that followed this constriction indicate that a normal response to anoxemia took place. The changes produced by definite mechanical anoxemia in the work of Gildea and Cobb are in many ways similar to those found in the brains of these animals shocked by alternating current. So it may be that the vascular constriction produced by this type of current may be a factor in causing the lesions observed.

Summary

Sublethal electric shocks were administered, by occiput and nose contact, to laboratory animals and the brains were subsequently removed and

studied histologically with the aim of ascertaining whether electricity produced lesions in the nervous system, and if so the nature of the lesions. Four types of current were used and were particularly selected because of their wave forms, so that the factors of direction of flow, polarity, impact, heat value, and frequency could be considered. It was found that lesions were produced in the brain, sometimes even after a single shock; the nature of the lesions depended, at least to some extent, on the nature of the current, similar wave forms producing more or less similar lesions.

There were some overlapping types of lesions, such as hemorrhage, which could be found in all cases, and shrinkage of ganglion cells, which could be found in three classes of cases; but in general the various combinations of lesions were characteristic of the effects of different types of current.

Nearly all the structures in the brain were involved in these pathologic processes. The ganglion cells were swollen under some circumstances and shrunken under others. The myelin was affected chiefly in cases where the glia proliferated and the nerve cells were swollen. In practically all cases there was congestion and hemorrhage. Edema of the brain was a common finding and, in conjunction with the swelling of oligodendroglia and the production of mucocytic or galactolipoid degeneration, presented interesting vacuolar lesions. In an attempt to explain the mechanism of the production of these lesions, the heat generated in the brain under most vigorous electric strain was measured; it was found to be relatively insignificant as long as the blood circulation was maintained, but it increased rapidly when the circulation was stopped.

Furthermore, by means of the special technic devised by Forbes, the vessels on the surface of the brain were observed during electric shock and it was found that they constricted or dilated during the passage of current, depending upon the kind of current used. The condenser discharge and induction coil currents

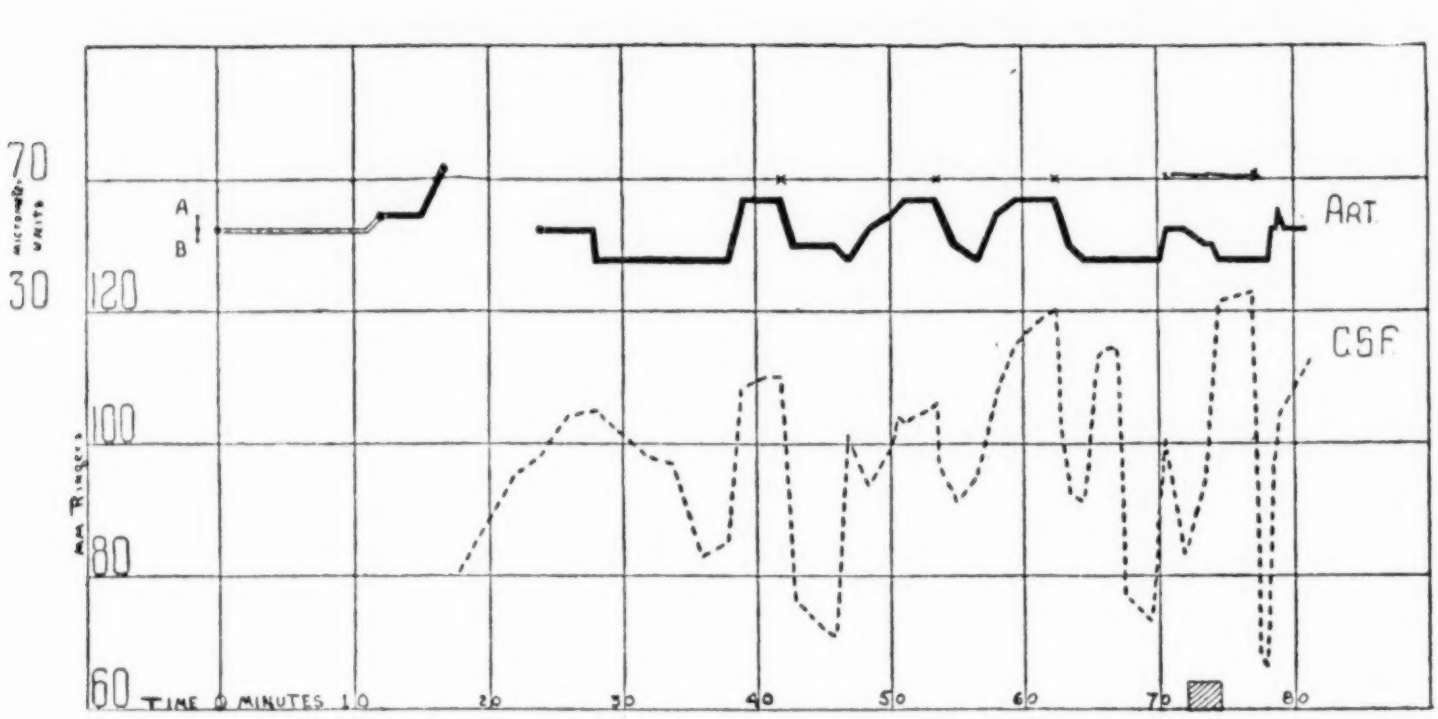

FIG. 28.—Alternating current shocks. Shocks were administered at points marked X.

caused the vessels to dilate and the intracranial pressure to rise; histologically, one of the most characteristic lesions from these types of current consisted in swelling, liquefaction, and vacuolization of the ganglion cells. The alternating current, on the other hand, brought about a constriction of the pial vessels, a slowing of the blood flow, and histologically a pronounced shrinkage of the ganglion cells. It may be, of course, that these lesions were caused by the direct action of electricity on the nerve cells and the glia, but in view of the fact that at least some of them could have been caused by these forms of vascular response, attention is directed to the coincidence of vascular response with type of tissue change.

Conclusion

From experiments made by passing electric shocks through the heads of animals in quantities too small to produce immediate death, but severe enough to render the animal unconscious, it may be deduced that:

1. Electric shock when passed through the head produces lesions in the brain.

2. There is a correlation between the type of lesion and the electric wave form.

3. Heat plays but a minor rôle in the production of these lesions.

4. The intracranial vascular changes during a particular type of shock are consistent with the type of lesions produced by such shock.

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THE INCIDENCE OF ILLNESS AMONG WAGE EARNING ADULTS

(*Concluded*)

DEAN K. BRUNDAGE

Alcoholism

Alcoholism is a factor of nominal importance in some industries, but is encountered so frequently in certain other industries as to make necessary the measurement and evaluation of its effect upon the sickness rate before the influence of other factors can be gauged. In the investigation of causes of absence from work in several dusty trades made by field agents of the Public Health Service, the rate of absence on account of heavy drinking was found to vary from two absences annually lasting two consecutive working days or longer per 1,000 men employed by a cotton manufacturing establishment in South Carolina, and four absences from work annually per 1,000 men in the granite cutting industry of Barre, Vt., to a rate of 128 among a group of cement workers in one of the South Atlantic states, and 403 among a group of miners in the Wilkes-Barre anthracite coal field (Table 15). Among 250 cement workers, alcoholism was reported as the cause of ninety-eight disabilities lasting two consecutive days or longer in a three-year period, being exceeded only by disabilities on account of in-

TABLE 15.—FREQUENCY OF ABSENCE LASTING TWO CONSECUTIVE WORKING DAYS OR LONGER DUE TO ALCOHOLISM IN SEVERAL DUSTY TRADES STUDIED BY THE UNITED STATES PUBLIC HEALTH SERVICE

TRADE	ANNUAL NO. OF CASES PER 1,000	NO. OF CASES[1]	NO. OF YEARS OF LIFE UNDER OBSERVATION
Cotton mfg.[2]	2	2	801
Granite cutting[3]	4	7	1,346
Silver polishing[4]	20	14	715
Bituminous coal mining[5]	43	21	494
Cement mfg.[6]	128	98	763
Anthracite coal mining[7]	403	450	1,116

[1] One person frequently had more than one disability from alcoholism.
[2] October, 1926, to January, 1928.
[3] April, 1924, to July, 1926.
[4] February, 1924, to February, 1925.
[5] February, 1924, to June, 1927.
[6] February, 1922, to February, 1925.
[7] January, 1924, to September, 1925.

fluenza and grip which numbered 157. During a period of one year and eight months among 650 hard coal miners 450 disabilities lasting two days or longer were recorded as due to heavy drinking, this number being almost as many as the absences on account of all respiratory diseases combined.

Analysis of the group addicted to excessive drinking among the cement company employees showed that it comprised only about 8 per cent. of the number on the payroll (in terms of years of life under observation). In this relatively small group the frequency of disabling respiratory diseases was 19 per cent. higher, and the rate of nonrespiratory diseases 79 per cent. higher, than for the rest of the employees. The record for the anthracite coal miners showed that absences on account of alcoholism occurred among about 19 per cent. of the men (in terms of years of life under observation), and that this group experienced disability from respiratory diseases 67 per cent. oftener, and from nonrespiratory diseases 46 per cent. oftener, than did all other employees of the mines. (See Table 16.)

TABLE 16.—FREQUENCY OF SICKNESS DUE TO RESPIRATORY AND NONRESPIRATORY DISEASES CAUSING DISABILITY FOR TWO CONSECUTIVE WORKING DAYS OR LONGER AMONG HEAVY DRINKERS AS COMPARED WITH ALL OTHER EMPLOYEES IN TWO DUSTY TRADES

EMPLOYEE GROUP	NO. OF YEARS OF LIFE UNDER OBSERVATION		ANNUAL NO. OF CASES PER 1,000 MEN				RATIO TO RATE FOR ALL OTHER EMPLOYEES			
			Respiratory Diseases		Nonrespiratory Diseases		Respiratory Diseases		Nonrespiratory Diseases	
	Cement Workers	Anthracite Coal Miners	Cement Workers	Anthracite Coal Miners	Cement Workers	Anthracite Coal Miners	Cement Workers	Anthracite Coal Miners	Cement Workers	Anthracite Coal Miners
All employees	763	1,116	426	450	279	514	...	...	...	...
Employees whose record showed absence due to alcoholism	64	211	500	668	469	692	119	167	179	146
All other employees	699	905	419	400	262	473	100	100	100	100

The distribution of the absences reported as due to alcoholism is especially interesting. There were only two such absences among the cement workers exposed to comparatively favorable working conditions, the rate for those exposed to relatively little dust, etc., being seventeen absences annually per 1,000 men as contrasted with a rate of 236 among employees of the mechanical department engaged in generally heavy work incident to emergency and general

repair work, a rate of 263 among the quarry workers carrying on heavy work in all kinds of weather, and a rate of 485 among those exposed to the heat of the kiln room (Table 17). and mine laborers exposed to extremely high concentrations of carbon dust and to the arduous labor of cutting and loading the coal as among all other employees of the mines as a

TABLE 17.—FREQUENCY OF ABSENCE LASTING TWO CONSECUTIVE WORKING DAYS OR LONGER DUE TO ALCOHOLISM AMONG MEN EXPOSED TO SPECIFIED WORKING CONDITIONS IN A PORTLAND CEMENT PLANT AND IN TWO ANTHRACITE COAL MINES

EMPLOYEE GROUP EXPOSED TO	NO. OF YEARS OF LIFE UNDER OBSERVATION	NO. OF ABSENCES	ANNUAL NO. OF ABSENCES PER 1,000 MEN
Portland Cement Plant			
All employees	763	98	128
Comparatively little dust[1]	116	2	17
Heavier concentrations of dust[2]	323	21	65
Yard labor[3]	107	13	121
Sudden changes in working conditions[4]	89	21	236
Quarry labor[5]	95	25	263
Heat in kiln room	33	16	485
Two Anthracite Coal Mines			
All employees	1,116	450	403
Cutting and loading coal[6]	855	405	474
All other occupations[7]	261	45	172

[1] Employees of the office, storeroom, laboratory, power and electrical departments, and yard (except yard laborers).

[2] Those exposed to limestone, gypsum, and bituminous coal dust; also all employees of the finishing, bag, and packing departments.

[3] Yard laborers only.

[4] Incident to emergency and general repair work carried on by those in the mechanical department.

[5] Heavy work in all kinds of weather.

[6] Work of miners and mine laborers.

[7] Includes runners and drivers, motormen, brakemen, car couplers, tracklayers, timbermen, rock workers, breaker boys, door boys, footmen, pipemen, oilers, blacksmiths, barn bosses, foremen, fire bosses, engineers, etc.

In the anthracite coal mining group the frequency of absence for two days or longer on account of alcoholism was 2.7 times as great among the miners group, which includes the less dusty and less arduous occupations.

Although these rates are based on rather small numbers, the heavy

drinking appears to have been concentrated so largely in the groups doing the laborious, disagreeable work as to indicate a significant tendency. It is consistent, moreover, with what has been found in England. The most intemperate counties there, as judged by the number of arrests for drunkenness, are the great coal counties of England and Wales (6). After reviewing the English data bearing on the use of alcoholic stimulants by industrial workers, two eminent industrial hygienists (7, pp. 278–279) conclude that among persons in disagreeable industrial occupations the attraction of alcohol is immense, because, owing to its narcotic action, alcohol blunts the psychic sensitiveness to the discomfort of environment. This alleviation of misery, they state, is purchased at the cost of an enhanced general death rate. The price appears to include a higher sickness rate as well. Reduction of industrial drinking may be closely connected with improvement in working conditions and greater attention to the hygienic aspect of industry.

Industrial Selection

Since an industrial group is composed of individuals who are ordinarily able to engage in wage earning occupations, it is to be expected that it represents a somewhat favorably selected group from a physical standpoint. If an industry involves no health hazards of consequence, the sickness rate among its employees should be lower than in the general population, embracing as it does invalids and persons with physical impairments so serious as to preclude attempts at factory employment. It is unfortunate that we cannot measure accurately the difference in the sickness experience of industrially employed persons and those in the general population including persons at home and not gainfully employed. The first difficulty is that there is no satisfactory way of ascertaining when a person not employed is actually disabled by sickness and would have remained at home on account of illness if he had been employed at the time. The second difficulty lies in the fact that the same method of obtaining information in regard to sickness is not feasible for both groups. In industrial establishments one can obtain an exact record of absences from work and can ascertain the causes of absence by means of visiting nurses or others employed to look up absentees. In a study of the health of a general population group, however, it is usually necessary to obtain the data through repeated house-to-house canvasses at intervals of a month or six weeks. The latter method may produce an understatement of the amount of disabling sickness, because some of the shorter cases are not remembered a month or so after they have terminated.

A comparison of results of school sickness records with records obtained for the same children by means of repeated house-to-house canvasses in Hagerstown, Md., revealed that the short illnesses were frequently missed when the canvasses were at intervals of six to eight weeks. Apparently only about one-fifth of the one-day absences and one-fourth of the two-day absences on account of sickness were obtained by the canvass method. The results for the two methods

checked remarkably well for absences of three days or longer due to various specific causes with the exception of "headaches," which appeared more frequently in the school reports. The repeated canvass method also compared favorably with records of industrial employees disabled on account of illness for periods lasting *three* days or longer. It appears legitimate, therefore, to compare the age curves of illness in the general population of Hagerstown with the age curves of sickness in different industrial groups even though one cannot take at face value the indicated magnitude of the sickness rates of the groups.

In Table 18 and Figure 6 the age curve of illness of the Hagerstown population is compared with a similar curve for employees of a rubber manu-

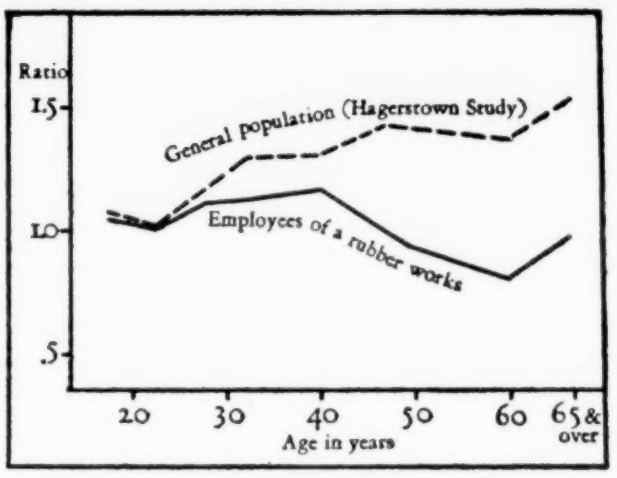

FIG. 6.—A comparison of the variations in sickness according to age in a general population group and in a group of industrial employees. The variations are relative, the rate for the age period 20 to 24 being taken as 1.

TABLE 18.—FREQUENCY OF SICKNESS, EXCLUSIVE OF ACCIDENTS, ACCORDING TO AGE AMONG EMPLOYEES OF A RUBBER WORKS, 1921 TO 1924, AS COMPARED WITH A GROUP OF WHITE PERSONS IN THE GENERAL POPULATION OF HAGERSTOWN, MD., DEC. 1, 1921, TO MARCH 31, 1924[1]

AGE GROUP	ANNUAL NO. OF CASES PER 1,000 PERSONS		RATIO TO RATE FOR AGE PERIOD 20–24		NO. OF CASES	
	Rubber Workers[2]	General Population	Rubber Workers[2]	General Population	Rubber Workers[2]	General Population
All ages	514	897	...	...	10,053	9,462
15–19	505	764	105	107	1,436	1,062
20–24	483	712	100	100	2,324	809
25–29	537	825	111	116	2,043	1,020
30–34	543	920	112	129	1,418	1,136
35–44	562	924	116	130	1,825	2,006
45–54	441	1,009	91	142	713	1,691
55–64	379	959	78	135	227	863
65 and over	466	1,080	96	152	61	875
Unknown	...	.....	...	...	6	0

[1] Record of absences from work for two days or longer on account of illness among the rubber workers. For the general population a record of illnesses was obtained by means of house-to-house canvasses covering about one-third of the population of Hagerstown at intervals of from six to eight weeks.

[2] The average sickness rates for both sexes were used for employees of the rubber works to correspond with an approximate 50–50 sex ratio in the general population.

facturing establishment in Massachusetts. In the rubber works more males than females were employed, but a simple average of the rates for the two sexes is shown so as to correspond with an approximately 50-50 sex ratio in the general population of Hagerstown. In the graph the sickness incidence rate for the age period 20 to 24 is taken as 1 in both industrial and general population groups in order to facilitate comparison of the trend in the age curves of illness. In the general population the trend is seen to be steadily upward from ages 20 to 24 on; but among employees of the rubber company, the frequency rates (based on disabilities lasting two working days or longer) rose more slowly from age 25 to 40, and then actually declined up to about age 60, after which the upward trend in the frequency of disability was resumed.

Comparisons with other industrial groups are not added here, because several have been included in Hagerstown Morbidity Study No. IV (8, pp. 1569–1571). Sickness frequency according to age in the general population of Hagerstown was compared with that among members of the Leipzig Local Sick Fund (Germany), the Manchester Unity Friendly Society (England), the Workmen's Sick and Death Benefit Fund (United States), and among employees of three large steel manufacturing plants in this country. The Hagerstown curve exhibits a greater rise in the frequency of sickness between the ages of 25 and 55 than do any of the others.

Since we are considering age curves rather than the actual rates, the failure of illness frequency to increase with age as rapidly among industrially employed persons as among those in the general population *suggests* that the healthier persons may tend to remain in industry to a greater extent than the sickly, thus providing a more favorably selected group from a health standpoint in middle age and beyond than is found among those just beginning industrial life. The reality of such a tendency is indicated from the recent experience of a public service company in Massachusetts which had under consideration the advisability of compulsory retirement of all its employees over age 70. The company maintains excellent records of absence on account of illness, and so could ascertain the amount of disability experienced annually by persons in different age groups. The company was amazed to find that the amount of sickness among its employees over age 70 compared very favorably with that of younger age groups. The liability to disabling sickness ordinarily increases markedly at the higher ages; the favorable record for the older employees of this and probably other industrial establishments evidently results from a process of survival of those relatively the most fit (in the sense of possessing the physical and mental ability to carry on).

If a process of selection of the sort suggested really goes on in industry, one should expect lower sickness rates among persons with the longer service in industries relatively free from health hazards. Sickness incidence rates according to length of service with the company are, therefore, presented in Table 19 for employees of a rubber manufacturing establishment in Ohio. The results are rather

TABLE 19.—FREQUENCY OF SICKNESS, INCLUDING NONINDUSTRIAL ACCIDENTS, CAUSING ABSENCE FOR ONE DAY OR LONGER AMONG EMPLOYEES OF A RUBBER COMPANY IN OHIO DURING THE TWO YEARS ENDING NOV. 1, 1920, ACCORDING TO LENGTH OF SERVICE WITH THE COMPANY[1]

LENGTH OF SERVICE	AVERAGE NO. OF EMPLOYEES	NO. OF CASES	ANNUAL NO. OF CASES PER 1,000 EMPLOYEES
All lengths	17,741	61,561	1,735
Under 3 months	4,433	22,137	2,497
3–6 months	2,500	12,183	2,437
6 months–1 year	3,060	11,469	1,874
1–5 years	5,256	12,907	1,228
5 years and over	2,492	2,865	575

[1] (9, p. 3090).

TABLE 20.—FREQUENCY OF ABSENCE DUE TO DISABILITY, EXCEPT FOR ACCIDENTS, LASTING ONE DAY OR LONGER AMONG PERSONS IN THE SERVICE OF A PUBLIC UTILITY IN NEW ENGLAND LESS THAN FIVE YEARS AS COMPARED WITH THOSE OF FIVE OR MORE YEARS' SERVICE, DURING THE THREE YEARS ENDING DEC. 31, 1924

AGE GROUP	ANNUAL NO. OF ABSENCES PER 1,000 ON PAYROLL		NO. OF ABSENCES		NO. OF YEARS OF LIFE UNDER OBSERVATION	
	Less than 5 Years' Service	5 or More Years' Service	Less than 5 Years' Service	5 or More Years' Service	Less than 5 Years' Service	5 or More Years' Service
Males						
All ages	1,241	841	3,862	2,537	3,111	3,018
Under 25	1,256	804	1,530	74	1,218	92
25–34	1,252	856	1,426	695	1,139	812
35–44	1,290	850	587	925	455	1,088
45–54	1,108	836	276	551	249	659
55 and over	860	795	43	292	50	367
Females						
All ages	2,533	1,794	2,637	838	1,041	467
Under 25	2,607	1,961	1,627	151	624	77
25–34	2,736	2,029	807	426	295	210
35–44	1,761	1,580	162	177	92	112
45 and over	1,367	1,235	41	84	30	68

striking. The frequency of disabling sickness decreased markedly among persons with the longer employment in the industry, the rate being more than four times as high among those with less than three months' service as among persons having more than five years' service.

It was not possible to carry the analysis further along this line with the data from the rubber company, but the sickness records of a public utility in New England enable us to present in Table 20 illness rates by length of service for different age groups. In each age group, among

TABLE 21.—FREQUENCY OF ABSENCE DUE TO SICKNESS, EXCLUSIVE OF ACCIDENTS, OF SPECIFIED DURATION AMONG MEN IN THE SERVICE OF A PUBLIC UTILITY IN NEW ENGLAND LESS THAN FIVE YEARS AS COMPARED WITH MEN OF FIVE OR MORE YEARS' SERVICE, DURING THE THREE YEARS ENDING DEC. 31, 1924

AGE GROUP	ANNUAL NO. OF ABSENCES PER 1,000 MEN ON PAYROLL		NO. OF ABSENCES	
	Less than 5 Years' Service	5 or More Years' Service	Less than 5 Years' Service	5 or More Years' Service
Lasting 1 to 3 Calendar Days				
All ages	837	490	2,605	1,479
Under 25	897	554	1,092	51
25–34	851	546	969	443
35–44	802	501	365	545
45–54	634	464	158	306
55 and over	420	365	21	134
Lasting 4 to 7 Calendar Days				
All ages	251	201	781	605
Under 25	224	196	273	18
25–34	262	191	299	155
35–44	284	199	129	217
45–54	269	206	67	136
55 and over	260	215	13	79
Lasting 8 Calendar Days or More				
All ages	153	150	476	453
Under 25	135	54	165	5
25–34	139	119	158	97
35–44	204	150	93	163
45–54	205	166	51	109
55 and over	180	215	9	79

females as well as among males, definitely lower rates of sickness are shown for those in the employ of the company more than five years than among those with less than five years' service.

Since the sickness incidence rates in this table included all disabilities lasting one day or longer, it was possible that the long-term employees simply had a smaller number of minor maladies, but just as many major illnesses as the short-term employees. Sickness rates were computed, therefore, for the disabilities lasting one to three calendar days, four to seven calendar days, and eight days and over. For sickness of different severity as measured by these periods of duration of disability, the employees of five or more years' service consistently showed lower rates than those of less than five years' service. The data for the males only are presented (see Table 21 and Fig. 7), but similar results were obtained for females (10, p. 321).

If, as has been suggested, a process of selection goes on through the self-elimination from an industry of those less well adapted physically to the nature of the work and the working conditions involved, one should expect the frequency rate of disabling sickness to be higher among those who quit than among those who remained, provided no health hazard increased immediately the morbidity of those who did not quit. Such sickness rates could not be computed for the public utility and rubber workers, because the necessary "exposure" data were not available for those who quit and those who did not quit these industries. However, data of this sort were available for two other industrial groups, *i.e.*, employees of a Portland cement plant, and a group of anthracite coal miners. For these, sickness records were kept in connection with field studies of industrial hygiene undertaken by the Public Health Service. Absences were investigated by visiting nurses employed either by the Public Health Service or working under its direction. These workers are in dusty trades, but inasmuch as the deleterious consequences of dust inhalation do not occur immediately, it is possible to observe the selection factor as well as the effect of occupation.

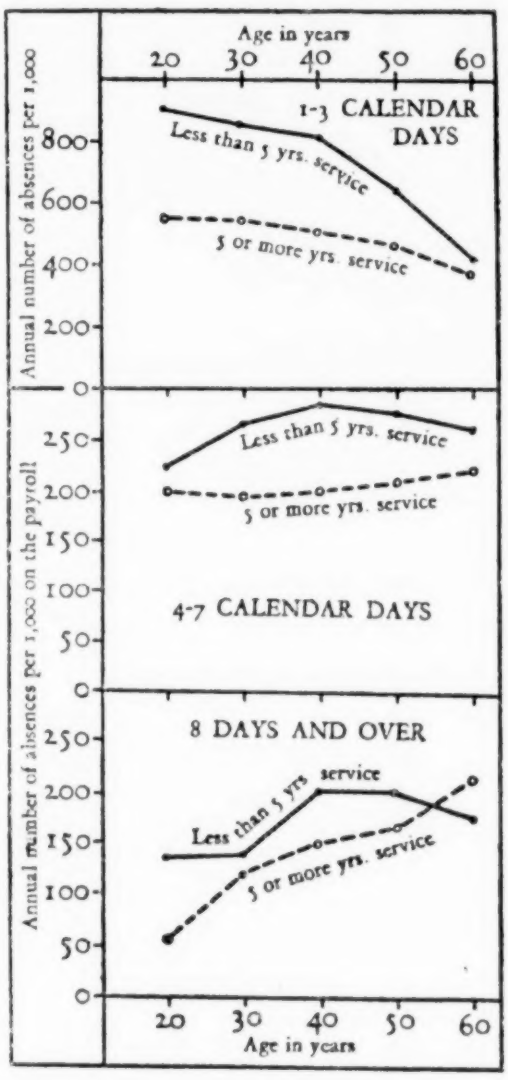

FIG. 7.—A comparison of the frequency of absence on account of sickness among men employed less than five years in a public utility in New England and men employed five or more years. The comparison is shown for absences lasting 1 to 3 days, 4 to 7 days, and 8 days or longer, and at different ages.

TABLE 22.—FREQUENCY OF DISABILITY LASTING TWO CONSECUTIVE WORKING DAYS OR LONGER DUE TO RESPIRATORY DISEASES AMONG THOSE WHO QUIT AS COMPARED WITH THOSE WHO DID NOT QUIT,[1] ACCORDING TO LENGTH OF SERVICE IN THE INDUSTRY SPECIFIED

	PORTLAND CEMENT PLANT				ANTHRACITE COAL MINING				
	All Lengths of Service[2]	Less than 4 Years' Service	4–8 Years' Service	More than 8 Years' Service	All Lengths of Service[2]	Less than 4 Years' Service	4–8 Years' Service	8–12 Years' Service	More than 12 Years' Service
Annual No. of Cases per 1,000 Men									
Those who quit	563	578	542	455	478	393	410	405	576
Those who did not quit	336	290	235	605	433	371	286	514	573
No. of Cases									
Those who quit	171	122	26	15	213	35	25	17	83
Those who did not quit	154	81	23	49	290	33	18	37	176
No. of Years of Life under Observation									
Those who quit	304	211	48	33	446	89	61	42	144
Those who did not quit	459	279	98	81	670	89	63	72	307

[1] During the period of the study: for employees of the cement plant, Feb. 6, 1922, to Feb. 1, 1925; for anthracite coal miners, Jan. 1, 1924, to Aug. 31, 1925.

[2] Including unknown length of service, the figures for which are not shown separately.

Among both the cement workers and the coal miners (Table 22), the frequency of disability lasting two consecutive working days or longer on account of respiratory illness was considerably higher in the group which quit than in the group which remained, among persons of less than about eight years' service. After approximately eight years the respiratory rates were more nearly of the same magnitude in the two groups, apparently reflecting the effect of the dust hazard which then began to exert an influence even upon those relatively the most immune to its effects.[3] Among the cement workers of less than eight years' service, the respiratory rate was about twice as high for the group which quit as for the group which did not quit during the three years of the study. Among the hard coal miners employed less than eight years, the respiratory incidence rate was about 20 per cent. higher in the group which quit than among those who did not quit during the year and eight months the study was in progress. The rising curve of respiratory sickness frequency with continued exposure to the dusts among those who tended to remain in the industry appears to measure in a fairly adequate way the effect of the occupational factor after industrial selection of those physically and men-

[3] For a fuller discussion of this point, see (11, pp. 71–93).

tally fitted for the kind of working environment involved had exerted its full mitigating influence. Although these rates are for respiratory diseases only, similar results were indicated for nonrespiratory diseases, and, therefore, for total sickness (11, Table 35).

That wide differences exist in degree of susceptibility possessed by workers to given industrial conditions is shown in studies of the dusty trades by the Public Health Service. A number of men exposed to large quantities of cement dust, for example, experienced no disabling respiratory attack during the three years of the study. In the health hazardous granite cutting industry of Vermont, a few men had as many as forty-five years of exposure to heavy concentrations of fine, free silica dust without developing the tuberculosis which almost inevitably follows such long-maintained employment in silica dust. Such instances

TABLE 23.—FREQUENCY OF RESPIRATORY ATTACKS AMONG MEN WHO EXPERIENCED RESPIRATORY DISABILITY LASTING TWO CONSECUTIVE WORKING DAYS OR LONGER DURING THE PERIOD OF THE STUDY, ACCORDING TO LENGTH OF SERVICE IN THE INDUSTRY SPECIFIED

LENGTH OF SERVICE	ANNUAL NO. OF CASES PER 1,000 MEN DISABLED		RATIO TO RATE FOR MEN WITH LESS THAN 4 YEARS' SERVICE		NO. OF CASES		NO. OF YEARS OF LIFE UNDER OBSERVATION	
	Those Who Quit[1]	Those Who Did Not Quit[1]	Those Who Quit[1]	Those Who Did Not Quit[1]	Those Who Quit[1]	Those Who Did Not Quit[1]	Those Who Quit[1]	Those Who Did Not Quit[1]
Portland Cement Plant								
All lengths	1,204	650	...	...	171	154	142	237
Less than 4 years	1,298	633	100	100	122	81	94	128
4–8 years	897	479	69	76	26	23	29	48
8–12 years	.....[2]	784	...[2]	124	13	29	13	37
12 years and over	.....[2]	870	...[2]	137	2	20	5	23
Unknown	.....	.....	...	...	8	1	1	1
Anthracite Coal Mining								
All lengths	1,626	1,208	...	...	213	290	131	240
Less than 4 years	1,667	943	100	100	35	33	21	35
4–8 years	1,563	1,000	94	106	25	18	16	18
8–16 years	1,300	1,197	78	127	39	73	30	61
16 years and over	1,525	1,414	91	150	61	140	40	99
Unknown	.....	.....	...	...	53	26	24	27

[1] During the period of the study: for employees of the cement plant, Feb. 6, 1922, to Feb. 1, 1925; for anthracite coal miners, Jan. 1, 1924, to Aug. 31, 1925.

[2] Not computed on account of the small numbers involved.

are exceptional, of course, and not typical, but they do illustrate the point that certain persons may be relatively immune to the effects of work or working conditions which to the average person would be definitely deleterious.

In order to bring out in more definite relief the effect of selection in conjunction with the factor of occupation, we have omitted from the morbidity picture for these two groups of workers the persons who were most immune to dust, *i.e.*, those having no respiratory disability during the period of the study. The frequency of respiratory attacks among those who experienced one or more such illnesses is shown for those who quit as compared with those who did not quit, by years of service in the industry (Table 23 and Fig. 8). The high

Inasmuch as sickness frequency tends to increase with age, and persons with the larger number of years of service tend to be the older men, a legitimate inquiry is whether the higher sickness rates found among persons of longer service merely reflect the age factor in disability. To afford information on this point, respiratory sickness incidence rates among all who did not quit during the period of observation were computed by length of service and according to age (Table 24 and Fig. 9). An increase in respiratory sickness frequency after approximately eight years' service was indicated to about the same extent among the men under 45 years of age as among those over this age in the cement plant, and to nearly the same extent in hard coal mining. The age factor apparently

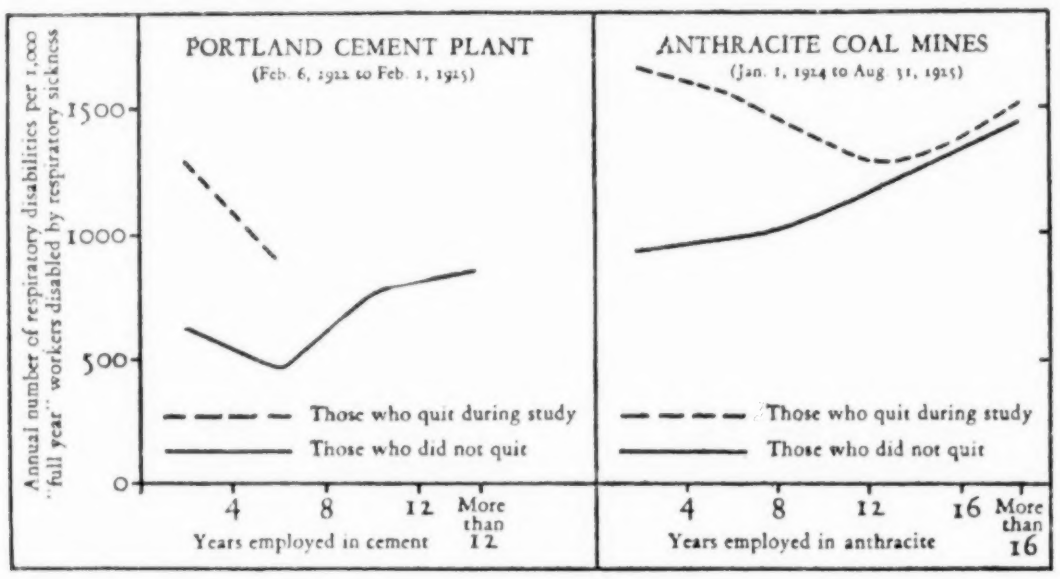

FIG. 8.—A comparison of the frequency of respiratory attacks among males who quit work and among males who did not quit work during certain periods of record. Only those who actually experienced some respiratory illness are included, and these are classified by length of service.

frequency of attack among those who quit during the first few years of employment is at once apparent, as is the lower but steadily mounting frequency of respiratory disability among those who did not quit during the study.

did not explain the higher sickness rates among the men of longer service.

In the cement study, fairly complete physical examinations were made, by Public Health Service physicians, of nearly all the men included in the sickness record. Each man examined

TABLE 24.—FREQUENCY OF DISABILITY LASTING TWO CONSECUTIVE WORKING DAYS OR LONGER DUE TO RESPIRATORY DISEASES AMONG THOSE WHO DID NOT QUIT,[1] ACCORDING TO LENGTH OF SERVICE IN THE INDUSTRY SPECIFIED, AMONG MEN UNDER 45 YEARS OF AGE AS COMPARED WITH THOSE 45 AND OVER

LENGTH OF SERVICE	ANNUAL NO. OF CASES PER 1,000 MEN		NO. OF CASES		NO. OF YEARS OF LIFE UNDER OBSERVATION	
	Under 45	45 and Over	Under 45	45 and Over	Under 45	45 and Over
Portland Cement Plant						
Less than 2 years	287	250	43	5	150	20
2–4 years	284	357	27	5	95	14
4–8 years	222	269	16	7	72	26
8 years and over	630	556	34	15	54	27
Anthracite Coal Mining						
Less than 4 years	388	...	66	...	170	...
4–8 years	328	320	38	16	116	50
8–16 years	510	...	101	...	198	...
16 years and over	519	701	83	117	160	167

[1] During the period of the study: for employees of the cement plant, Feb. 6, 1922, to Feb. 1, 1925; for anthracite coal miners, Jan. 1, 1924, to Aug. 31, 1925.

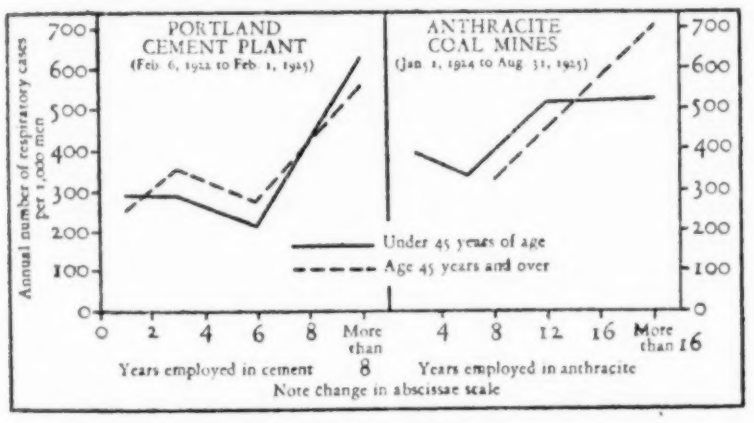

FIG. 9.—A comparison of the respiratory incidence rates for men under 45 years of age and for men over 45. Only those who did not quit during the period of the study are included, and these are classified by length of service.

was rated according to his physical status as explained in footnote 1 of Table 25. With this information one could ascertain whether a larger proportion of poor physical risks was found among those who quit. The years of life under observation rather than the number of different individuals were distributed in Table 25 according to the physical rating, in order to make the results strictly comparable with the sickness findings. It was surprising to discover that the percentage in each physical status was virtually the same among those who quit as among those who tended to remain in the industry. Apparently, physical defects and impairments were in evidence to no greater extent in one group than in the other. The physical examination findings as summarized in the ratings afforded no indication of the individual's degree of susceptibility to respiratory diseases or the extent to which one might be affected by cement dust. There remains the possibility that a specialized sort of physical examina-

TABLE 25.—DISTRIBUTION, ACCORDING TO PHYSICAL RATING, OF THOSE WHO QUIT AS COMPARED WITH THOSE WHO DID NOT QUIT THE SERVICE OF A PORTLAND CEMENT MANUFACTURING COMPANY DURING A THREE-YEAR PERIOD

PHYSICAL RATING AS MADE BY EXAMINING PHYSICIAN[1]	NO. OF YEARS OF LIFE UNDER OBSERVATION		PERCENTAGE	
	Those Who Quit	Those Who Did Not Quit	Those Who Quit	Those Who Did Not Quit
All ratings	292	458	100.0	100.0
Rating 1	154	236	52.7	51.5
Rating 2	90	143	30.8	31.2
Ratings 3 and 4	48	79	16.5	17.3

[1] Physical rating 1 included persons physically fit for any employment and having no physical defects of consequence. Physical rating 2 covered persons physically fit for any employment, but below par in physical development or possessing physical defects of some importance. Class 3 men were those physically fit only for certain jobs when specifically approved by the examining physician. Physical rating 4 was assigned to those physically unfit for any employment.

TABLE 26.—FREQUENCY OF DISABILITY LASTING MORE THAN ONE WEEK AMONG MALE WAGE EARNERS IN INDUSTRIES SPECIFIED, 1922 TO 1928

INDUSTRY	SICKNESS AND NONINDUSTRIAL ACCIDENTS	SICKNESS EXCLUSIVE OF ACCIDENTS	RESPIRATORY DISEASES[1]	DISEASES OF DIGESTIVE SYSTEM[2]	NONRESPIRATORY, NONDIGESTIVE DISEASES[3]	NONINDUSTRIAL ACCIDENTS (EXTERNAL CAUSES)[4]
Annual No. of Cases per 1,000 Men						
Iron and steel	91.0	81.4	37.1	12.0	32.3	9.6
Public utilities	114.4	105.5	52.7	16.6	36.2	8.9
Ratio to Rate for Iron and Steel Workers						
Iron and steel	100.0	100.0	100.0	100.0	100.0	100.0
Public utilities	125.7	129.6	142.1	138.3	112.1	92.7
No. of Cases						
Iron and steel	30,745	27,498	12,515	4,068	10,915	3,247
Public utilities	23,210	21,410	10,698	3,363	7,349	1,800

No. of years of male life under observation: iron and steel, 337,681; public utilities, 202,822.

[1] Title numbers 11, 31, 97–107, and 109 in the International List of the Causes of Death.
[2] Title numbers 108, 110–127.
[3] Title numbers 1–10, 12–30, 32–37, 41–96, 128–136, 151–159, 164 and 205.
[4] Title numbers 165–203.

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tion might forecast the probable reaction of applicants to dusty trades. In the cement study there was indication that men with small vital capacity should not be employed in an excessively dusty atmosphere, especially at ages below 25 (11, pp. 100–102). Criteria of this sort might be developed on the basis of experience, and the careful selection of persons relatively the most immune to the kind of exposure involved might mitigate the consequences of a number of now-serious industrial health hazards.

That selection may be favorable or adverse to a whole industry is indicated by other morbidity records. The sickness rates are unusually low in the steel industry, except for certain diseases, and rather high in the public utilities as a whole (Table 26). We know from a study of its conditions that the environment in steel making is not especially salubrious, nor does employment by public utilities generally involve serious hazards to health. In many of the occupations in the steel industry, only the sturdier, huskier types of men are capable of performing the work; consequently only the strongest apply for these jobs. On the other hand, in the public utilities, persons below par in health can and do carry on the lighter work involved. The relatively high disability rates of public utility workers are no more indicative of a health hazardous industry than are the low disability rates in the steel industry indicative of working conditions unusually conducive to good health. Rather, these results show that selection is of such importance as to make necessary the removal of this factor from the morbidity picture before one can accurately appraise the effect of occupation.

Occupational Health Hazards

In Certain Dusty Trades

Records of disability are available for a few dusty trades, either through statistics collected in the field by the Public Health Service, or through records incident to the payment of sick benefits. The record for general manufacturing shown in Table 27 may be considered as a control group, since it includes employees in a number of different manufacturing establishments in which no dust hazard of consequence is encountered. Rates for the iron and steel industry are also shown as an example of low sickness incidence in a favorably selected group. Only those cases which caused disability for more than one week were considered in Table 27.

Of the six industries shown, four represent dusty trades. The highest sickness frequency was found among gold miners in the Black Hills, but the highest respiratory disease rate occurred among the granite cutters of Vermont. The anthracite coal miners and the cement workers experienced sickness rates much higher than those of the control group. A high frequency of respiratory diseases was indicated in each one of the four dusty trades.

An extremely high prevalence of respiratory tuberculosis was found among the granite cutters of Barre and a high rate was indicated, also, in gold mining in the Black Hills. In both industries exposure to rock dust containing a high free silica

TABLE 27.—FREQUENCY OF DISABILITY LASTING MORE THAN ONE WEEK DUE TO SPECIFIED CAUSE AMONG MEN IN INDUSTRIES SPECIFIED

DISEASES CAUSING DISABILITY	GOLD MINING IN BLACK HILLS[1]	ANTHRACITE COAL MINING[2]	GRANITE CUTTING IN VERMONT[3]	CEMENT MFG. IN MARYLAND[4]	GENERAL MFG.[5]	IRON AND STEEL MFG.[5]
Rate per 1,000 Years Observed						
Sickness, exclusive of accidents	207.9	192.7	176.1	155.9	86.8	70.1
Respiratory diseases	107.4	88.7	120.4	89.1	40.5	33.2
Influenza and grip	65.6	43.9	34.2	59.0	18.8	16.7
Bronchitis (acute and chronic)	5.0	18.8	3.0	7.8	5.5	2.9
Tuberculosis	10.0	4.5	37.1	1.3	0.9	1.4
Pneumonia (all forms)	3.1	0.9	4.5	1.3	2.9	4.9
Diseases of the pharynx and tonsils	18.1	9.9	8.9	11.8	6.6	3.5
Other respiratory diseases	5.6	10.7	32.7	7.9	5.8	3.8
Diseases of the digestive system	28.1	30.5	14.1	13.1	12.2	9.3
Diseases of the stomach, diarrhea, enteritis	11.2	13.5	3.7	3.9	5.7	4.6
Appendicitis	12.5	0.9	3.7	3.9	3.0	2.3
Other digestive diseases	4.4	16.1	6.7	5.3	3.5	2.4
Diseases of the nervous system[6]	7.5	3.6	8.2	2.6	4.9	2.8
Diseases of the circulatory and genito-urinary systems	8.1	6.3	6.7	10.5	5.8	5.4
Diseases of the skin	6.2	9.9	0.7	9.2	4.0	2.5
Rheumatism (acute and chronic)	15.6	20.6	4.5	13.1	5.2	5.1
Ill-defined diseases	1.9	15.2	9.7	1.3	3.7	0.6
All other diseases except venereal	33.1	17.9	11.9	17.0	10.5	11.2
No. of Cases						
Sickness, exclusive of accidents	333	215	237	119	9,808	6,240
Respiratory diseases	172	99	162	68	4,579	2,958
Influenza and grip	105	49	46	45	2,124	1,483
Bronchitis (acute and chronic)	8	21	4	6	618	260
Tuberculosis	16	5	50	1	104	127
Pneumonia (all forms)	5	1	6	1	334	433
Diseases of the pharynx and tonsils	29	11	12	9	745	312
Other respiratory diseases	9	12	44	6	654	343
Diseases of the digestive system	45	34	19	10	1,380	831
Diseases of the stomach, diarrhea, enteritis	18	15	5	3	649	410
Appendicitis	20	1	5	3	337	209
Other digestive diseases	7	18	9	4	394	212
Diseases of the nervous system[6]	12	4	11	2	552	255
Diseases of the circulatory and genito-urinary systems	13	7	9	8	653	479
Diseases of the skin	10	11	1	7	453	217
Rheumatism (acute and chronic)	25	23	6	10	588	450
Ill-defined diseases	3	17	13	1	417	54
All other diseases except venereal	53	20	16	13	1,186	996
No. of years of life under observation	1,602	1,116	1,346	763	112,986	89,035

[1] Record for year 1925. [2] Record January, 1924, to September, 1925. [3] Record April, 1924, to July, 1925. [4] Record February, 1922, to February, 1925.

[5] Record for years 1922 to 1924, inclusive. "General mfg." includes employees of companies manufacturing chemicals, abrasives, paper, hats, clocks, and other products.

[6] Not including organs of special sense (eyes and ears).

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content is involved. The tuberculosis rate shown for anthracite miners was higher than the average for industrial workers generally, but on account of the small number of miners under observation, the indicated rate for a disease relatively as infrequent as tuberculosis does not afford a basis for conclusions.

A very surprising result was the definiteness of the excess in the incidence of influenza and grip in all four of the dusty trades. The excess was greatest in gold mining, and considerable in Portland cement manufacture, but was also clearly indicated in anthracite mining and granite cutting.

The scant data at present available suggest that bronchitis may be more prevalent among coal miners than among industrial workers generally. For respiratory illnesses with bronchial symptoms the indicated rate was high, as shown in unpublished data of the Public Health Service on a small group of bituminous coal miners in West Virginia, and the sickness records covering the coal miners of a steel company showed bronchitis at an excess of about 50 per cent. In fact, in this group of soft coal miners in Pennsylvania, all important respiratory diseases, *i.e.*, pneumonia, influenza, bronchitis, tuberculosis, asthma, diseases of the tonsils, and other respiratory diseases as a group occurred at rates higher than were experienced by all employees of the same company except those in certain departments in which health hazards were found.

Two nonrespiratory disease groups are included as illustrative of types of illness that appear to be associated with certain dusty trades. A high incidence of rheumatism was indicated in mining (both coal and gold), and in the cement plant (11, pp. 59–60). In three of the four dusty trades, diseases of the skin appeared to be unusually frequent. In the fourth dusty trade, granite cutting, diseases of the skin were conspicuous by their absence. A high standard of living was observed among the granite workers of Vermont, and it is possible that the personal hygiene factor may altogether counteract any deleterious effect which a silicious dust may exert upon the condition of the skin.

Pneumonia in the Steel Industry

In spite of an unusually favorable selection of workers in the steel industry as shown by the low rate of sickness, and even for respiratory diseases as a whole, the incidence of pneumonia was higher in steel than in any of the industries shown. A special study of this problem by the Office of Industrial Hygiene and Sanitation of the United States Public Health Service is now nearing completion.

The extent to which the more important respiratory diseases were unusually frequent among employees of certain departments of a steel plant is shown in Table 28. The data were obtained from the records of the sick benefit fund, and cover cases lasting longer than one week. The control group used as a basis for judging whether the incidence was excessive was the rate for all employees of the company as a whole, exclusive of the office and the departments in which health hazards were uncovered.

In the blast furnace, coke ovens, and open hearth departments, influenza and pneumonia occurred at abnormal

TABLE 28.—FREQUENCY OF DISABILITY LASTING MORE THAN ONE WEEK DUE TO SPECIFIED RESPIRATORY DISEASES AMONG MEN IN CERTAIN DEPARTMENTS OF A STEEL PLANT AS COMPARED WITH A CONTROL GROUP,[1] 1924 TO 1928, INCLUSIVE

DEPARTMENT	ALL RESPIRATORY DISEASES	PNEUMONIA (ALL FORMS)	INFLUENZA AND GRIP	BRONCHITIS	TUBERCULOSIS	ASTHMA	DISEASES OF TONSILS	OTHER RESPIRATORY DISEASES
Annual No. of Cases per 1,000 Men								
Blast furnace	59.4	14.0	34.5	...[2]	...[2]	...[2]	...[2]	...[2]
Coke ovens	46.8	10.7	21.1	...[2]	...[2]	...[2]	...[2]	...[2]
Open hearth	65.5	8.5	33.2	6.5	...[2]	...[2]	6.5	...[2]
Bituminous coal mines	52.3	5.2	28.5	3.1	2.8	4.4	5.1	3.2
Control group	28.5	3.8	13.7	2.0	1.3	1.3	4.3	2.1
Percentage in Excess of Rates for Control Group								
Blast furnace	108	268	152	...	...	...	..	..
Coke ovens	64	182	54	...	...	...	..	..
Open hearth	130	124	142	225	...	...	51	..
Bituminous coal mines	84	37	108	55	115	239	19	52
No. of Cases								
Blast furnace	153	36	89	9	5	3	8	3
Coke ovens	122	28	55	13	6	4	13	3
Open hearth	231	30	117	23	8	14	23	16
Bituminous coal mines	428	43	233	25	23	36	42	26
Control group	757	101	365	52	34	35	115	55

No. of years of life under observation: blast furnace, 2,578; coke ovens, 2,609; open hearth, 3, 527; bituminous coal mines, 8,185; control group, 26,523.

[1] Control group consists of all departments of a steel plant except office, blast furnace, coke ovens, open hearth, coal mines, railroad, rod and wire mills, shops, and general to mills.

[2] Rates not computed when number of cases was less than 20.

frequency, and in open hearth, bronchitis as well. In each of these departments a heat hazard is involved, the employees being exposed to extremely wide variations in temperature. Under such working conditions the facts concerning the occurrence of respiratory diseases are especially important.

Summary

Analysis of available statistics of morbidity for sample groups of industrial workers in this country showed among other points the following:

1. During the eight years from 1921 to 1928, inclusive, respiratory diseases caused nearly one-half of all the dis-

abilities on account of sickness. The second most important group of diseases from the standpoint of sickness frequency was the digestive disease group. The contagious and infectious diseases against which public health effort is often so largely concentrated caused only about 3 per cent. of the cases.

2. Among industrial workers disabilities lasting more than one week apparently do not increase markedly with age prior to about age 50. The number of days lost per person tends to increase more rapidly with age than does the frequency of illness. The duration of incapacitation increases considerably as age advances.

3. Female industrial workers tend to be absent on account of illness from 50 to 100 per cent. oftener than the males, the widest disparity in the rates of the two sexes being for the shorter sicknesses. Considerable difference appears to exist in the relative susceptibility of the two sexes to certain diseases.

4. Immigrant workers from the warm regions of southern Europe appear to be more liable to attack from certain respiratory diseases than persons from northern and central Europe or those native to this country.

5. Married women on the factory payroll of a large rubber company experienced considerably more disability than the single women.

6. In two studies made by the Public Health Service, the excessive use of alcoholic stimulants was found to be most pronounced among the men doing the heaviest, most disagreeable work.

7. A process of selection appears to be going on in certain industries through the quitting of those less well adapted physically to the nature of the work and the working conditions to which they were exposed. Those who tend to remain indefinitely in an industry, especially if it involves some hazard to health, represent a favorably selected group from a health standpoint.

8. Studies of disabling sickness among the employees of different industries indicate a high rate of sickness, and especially of respiratory diseases, among gold miners in the Black Hills, granite cutters in Barre, Vt., several groups of coal miners, and among employees of a dusty cement plant. A high rate of pneumonia was found among men in certain departments of the iron and steel industry. A surprising result was the definiteness of the excess in the incidence of influenza in all four of the above-mentioned dusty trades. All the principal diseases of the respiratory system occurred at abnormal rates among a group of several thousand bituminous coal miners in Pennsylvania. Prevalence of bronchitis was indicated among persons exposed to large quantities of carbon dust and among those breathing the dusts generated in the manufacture of Portland cement.

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ABSTRACT OF THE LITERATURE

OF

INDUSTRIAL HYGIENE

SUPPLEMENTARY TO

THE JOURNAL OF INDUSTRIAL HYGIENE

EDITORS

DAVID L. EDSALL, M. D., S. D., United States
EDGAR L. COLLIS, M. D., M. R. C. S., Great Britain

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ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

A NEW AND RAPID METHOD FOR THE DETERMINATION OF MERCURY. *G. Spacu and G. Suciu. Abstr. from Bull. Soc. stiinte Cluj, 1929, vol. 4, pp. 403–408, in Chem. Abstr., July 10, 1929, vol. 23, p. 3184.*

If, at the boiling temperature, a neutral or a slightly ammoniacal solution of Hg^{++} salt is treated with potassium iodide followed by an excess of copper ethylenediamine nitrate [(Cu en_2) $(NO_3)_2$ $2H_2O$], the mercury is precipitated completely as the copper ethylenediamine mercury complex [(Cu en_2) (HgI_4)]. The precipitate contains 22.49 per cent. of mercury. The precipitation is complete in volumes ranging from 80 to 500 c.c. even in the presence of considerable ammonium chloride or ammonium nitrate. The reagent can be prepared by heating a mixture of 1 molecule of copper nitrate and 2 molecules of ethylenediamine on the water bath until a crystalline crust is obtained. Or, a solution of copper sulphate can be treated with diamine solution until the characteristic violet color of the complex salt is obtained; an excess of the diamine does no harm. To deter-

mine mercury in the presence of copper, make nearly neutral with ammonium hydroxide and finish the neutralization with ethylenediamine. Heat to boiling, add an excess of potassium iodide and an excess of copper ethylenediamine sulphate [(Cu en_2) SO_4]. Dilute with cold water to make the total volume 25 per cent. larger, cool quickly, filter, wash three to six times with water containing the reagents, then four times with 2-c.c. portions of alcohol, and finally three to four times with ether.—P. D.

AN ULTRAMICROCHEMICAL METHOD FOR THE DETERMINATION OF MERCURY. *J. Bodnár and E. Szép. Abstr. as follows from Biochem. Ztschr., 1929, vol. 205, pp. 219–229, in Chem. Abstr., June 20, 1929, vol. 23, pp. 2903–2904.*

The mercury is precipitated from its solution in 10 per cent. potassium chloride very easily and quantitatively by means of "nascent copper." This is accomplished by placing a piece of pure iron wire in the mercury solution to which a small amount of copper sulphate has been added. The copper is deposited on the iron wire, carrying the mercury with it. The mercury is then distilled off from the iron wire; the mercury droplets are formed into a single mass by centrifuging with alcohol. The diameter of the mercury drop is measured under the microscope and its weight calculated from this. By this procedure mercury can be accurately determined in amounts of 0.04 to 10γ.—P. D.

DETERMINATION OF MINUTE QUANTITIES OF MERCURY. *R. Thilenius and R. Winzer. Abstr, as follows from Ztschr. f. angew. Chem., 1929, vol. 42, pp. 284–288, in Chem. Abstr., July 10, 1929, vol. 23, pp. 3183–3184.*

The difficulties which Stock and his coworkers have experienced in determining traces of mercury are explained and it is shown how they can be avoided. Instead of dissolving mercury in chlorine aqueous, it is better to chlorinate with dry chlorine at a higher temperature. Precautions are necessary in order to get correct colorimeter readings. Minute directions are given for carrying out the work.—P. D.

DETERMINATION OF MINUTE QUANTITIES OF MERCURY. *A. Stock and W. Zimmermann. Abstr. as follows from Ztschr. f. angew. Chem., 1929, vol. 42, pp. 429–430, in Chem. Abstr., July 10, 1929, vol. 23, p. 3184.*

A reply to the foregoing criticism.—P. D.

ACCIDENTS CAUSED BY VARIOUS RADIATIONS. *F. Dervieux. Abstr. from Paris méd., Nov., 1928, pp. 422–424, in U. S. Month. Labor Rev., Jan., 1929, vol. 28, pp. 77–79.*

The author discusses the effects of occupational exposure to X-rays, radium, and various radioactive substances, and the recent decision of the French Superior Commission on Occupational Diseases to include diseases resulting from exposure to radiations from these elements among the reportable diseases.

The first signs of exposure to the radiations are blood changes, affecting first the white blood corpuscles and then the red. There is a reduction of the leukocytes in the peripheral blood below the normal standard or more rarely either a myeloid or lymphatic

leukemia. There is also a deficiency in the number of red blood corpuscles, with abnormal inequality or irregularity in their size. Blood changes occur very early and have been demonstrated following a single exposure to the gamma rays of radium, while there is also lowering of the arterial pressure but with a maintenance of the cardiovascular equilibrium. Radiations have a direct effect on the reproduction cells, and they cause troubles of nutrition, characterized by more or less marked loss of weight and showing various depressive symptoms, such as fatigue, drowsiness, headache, etc. In addition to these pathologic conditions the radiations have a traumatic effect resulting in radiodermatitis, burns, lesions of the skin and underlying tissues, and malignant growths, while the special action of the ultraviolet rays should not be forgotten.

The protective measures recommended by the French Academy of Medicine are adequate ventilation of workplaces, use of rubber gloves and of forceps for handling materials, protection from the rays by the use of lead plates of adequate thickness, and periodic medical examination and blood examinations of all workers exposed to the radiations.

A report upon the occupational diseases due to radiation presented to the Superior Commission on Occupational Diseases at a recent meeting listed uranium, and its salts, uranium X, and ionium among the elements presenting an industrial hazard in addition to those enumerated above. In this report it was recommended that the diseases which should be included among the reportable industrial diseases were skin affections, either acute or chronic, cancer, anemia with leukopenia, pernicious anemia and leukemia, and radium necrosis, all of which were the direct effects of radiation, while certain other diseases such as degeneration of the bone marrow, atrophy of the spleen, and troubles of gestation were not included as it is not always possible to determine positively that they are solely the result of exposure to radiation.

The Commission decided that the following types of industrial or commercial enterprises were potential sources of poisoning from these substances: plants for the extraction of radioactive elements from minerals, manufacture of derivative radioactive substances; plants making medical appliances for radium therapy, or X-ray appliances; laboratories for research or measurement of radioactive substances and X-rays; plants making radioactive chemical or pharmaceutic products, and factories making radioactive luminous products or workshops in which these paints are applied; clinics and sanatoriums, centers for the treatment of cancer; enterprises for the sale of radium and radioactive substances; and manufacturing establishments using X-rays.

The Commission fixed the limit of responsibility for the development of these diseases at one year with the exception of cancer, which it was considered might develop at any time within five years.

ADVANCED MINE RESCUE TRAINING. PART III. PROTECTION AGAINST GASES ENCOUNTERED IN MINES. *J. J. Forbes and G. W. Grove. U. S. Bur. Mines, Miners' Circ. 35, 1929, pp. 53.*

This paper gives an account, with illustrations, of the following: methods of protection against mine gases, erection of barricades during fires or following explosions, the carbon monoxide self-rescuer, gas masks, oxygen breathing apparatus, and resuscitation by means of manual methods and inhalators.

Although there is practically nothing here which has not already been published in the Bureau's series of Technical Papers, the bringing together of this material into a single pamphlet is welcome.—P. D.

GANGRENE OF LUNGS IN POISONING WITH SEWER GAS. *C. Barth. Abstr. as follows from Presse méd., May 8, 1929, vol. 37, p. 603, in Jour. Am. Med. Assn., July 13, 1929, vol. 93, p. 158.*

Barth reports an unusual case of poisoning with sewer gas complicated by gangrene of the left lung in a man, aged 56, who was the victim of an accidental rupture of a sewer drain. The acute symptoms of poisoning (coma, cyanosis, Cheyne-Stokes type of respiration, and cardiac weakness) disappeared quickly, but one week later there appeared symptoms of gangrene of the left lung, with the presence of anaerobes in the profuse, fetid expectoration. The condition was cured in a month by a combined treatment with autovaccines and emetine.—K. R. D.

THE BIOLOGIC ACTION OF THALLIUM ACETATE. *A. Buschke and B. Peiser. Abstr. as follows from Gior. ital. di dermat. e sifil., June, 1929, vol. 70, p. 585, in Arch. Dermat. and Syph., Oct., 1929, vol. 20, pp. 524–525.*

The authors resume their experiments of many years, stating that thallium acetate acts through the sympathetic-endocrinous system, and like the other poisonous metals (arsenic, lead, etc.) it produces systemic disturbances which may be serious. The action of thallium on the hair is limited to the hairs under the control of the sympathetic system, whereas hair innervated by the central nervous system is not affected by thallium. Cataract and bone decalcification observed in about 10 per cent. of the animals of experimentation show in a positive manner that the parathyroid glands are affected. In some cases the authors have proved the existence of atrophy of the thyroid gland affecting the follicles and flattening of the epithelium. Atrophy of the testicles also has been observed. Alteration of the suprarenal glands and thymus have also been reported by Hecke. The authors have also observed the retard of growth in animals fed with thallium. Thallium may be absorbed by the skin when applied locally producing alopecia and other toxic phenomena.

FORMATION OF TOXIC GASES IN THE MANUFACTURE OF WASHING COMPOUNDS CONTAINING TRICHLOROETHYLENE. *Welwart. Abstr. as follows from Seifensieder-Ztg., 1929, vol. 56, p. 26, in Chem. Abstr., July 10, 1929, vol. 23, p. 3361.*

Toxic gases were formed when a fresh lot of trichloroethylene washing compound was made by charging the kettle with the required amount of solid potassium hydroxide, which on coming into contact with a few liters of liquor left in the kettle from the last operation formed a concentrated hot

potassium hydroxide solution. This decomposed the trichloroethylene into formate, carbon monoxide, ethylene, and traces of dichloroacetylene, which latter caused spontaneous ignition of the mass after a sufficient amount had accumulated.—P. D.

COLORIMETRIC DETERMINATION OF TURPENTINE VAPORS IN AIR. *P. N. Andreev and A. A. Gavrilov. Abstr. as follows from Jour. Chem. Inst. (Moscow), 1928, vol. 5, pp. 1282–1287, in Chem. Abstr., June 20, 1929, vol. 23, p. 2908.*

The concentration of turpentine vapors in the atmosphere is often determined by their absorption in concentrated sulphuric acid followed by an oxidation with a chromium trioxide mixture, yielding definite quantities of carbon dioxide. In absence of other hydrocarbons in air this method is fairly reliable, but requires much time. Andreev and Gavrilov's rapid method is based on the intensity of the color produced with concentrated sulphuric acid. The results obtained vary between 99.9 and 101.6 per cent. of the real turpentine contents of the samples, provided the colorimetric comparison is made after one to three hours from the time the samples were made. On keeping the samples a longer time the intensity of the coloration increases more rapidly in the more concentrated solutions of turpentine in sulphuric acid than in dilute solutions. The presence of fairly large quantities of benzine and benzene has practically no effect upon the results.—P. D.

POISONS IN THE WOODWORKING INDUSTRY. *L. Lewin. Contributions to the Knowledge of Poisons, no. 1, 1928, pp. 23. Abstr. as follows in Bull. Hyg., Aug., 1929, vol. 4, pp. 647–648.*

This is the first of a series of studies on poisons to be edited by the well-known toxicologist Dr. L. Lewin and it is written by him. In the introduction he refers to the manifold ways in which persons may come to be exposed to poisonous substances—by criminal intent, by chance exposure or accident, and by industrial activity in their preparation or the handling of materials such as woods which contain them. With the co-operation of other scientific workers he proposes to publish subsequent brochures containing matter which, because of its technical character, will not be found in textbooks.

He allows himself a wide latitude in his treatment of the woodworking industry, as he not only gives a brief account of so-called poisonous woods, but also of the varnishes and dyes used. His main object is to show that dermatitis and eczematous ulceration arising from the dust of poisonous woods or from the substances handled in treating wood should no longer be treated as industrial diseases, but rather as accidents entitling to compensation such as has now a limited application in Germany under the Order of May 12, 1925. [All forms of these conditions when *due to dust or liquids* are scheduled under the Workmen's Compensation Act in Great Britain.]

Lewin takes chrome ulceration (from contact with bichromate of potassium or sodium) as the typical form of skin irritation set up. He next deals with the coal tar dyes. By means of heavy type it is easy to pick out the many

kinds which especially injure the skin. In a general way those having a yellow or orange color are the most injurious while the blue, brown, and black come second. Violet, green, and red dyes are least active. He mentions that at the Basle eye hospital 77 cases of eye injury through aniline colors occurred in twelve years, distributed as follows: Victoria blue 19; safranin 10; crystal violet 9; auramine 2; rhodamine and malachite green 1 each; others 29. In 36 cases the lesion was a keratitis and in 41 conjunctivitis. Washing out with a 5 to 10 per cent. solution of tannic acid was found useful. He refers under fuchsin to the tumors of the bladder associated with the triphenylmethane derivatives.

In his observations on poisonous woods Lewin adopts a botanical classification. He does not pretend that it is complete, but his references show his reading to have been fairly wide. He does not mention any names. A great deal of information is packed away in the brochure.—T. M. L.

DUST HAZARDS AND THEIR EFFECTS

A Study of the Efficiency of Dust-Removal Systems in Granite-Cutting Plants. *J. J. Bloomfield. U. S. Pub. Health Rep., Oct. 18, 1929, vol. 44, pp. 2505–2522.*

Data are presented concerning the efficiency of certain ventilating devices in use in two modern granite cutting plants, as well as certain experimental results obtained in one of these plants.

The author summarizes the study as follows:

Prior to discussing the studies conducted in the plants using local exhaust ventilation, certain data were presented concerning the conditions existing in those plants not using modern dust removal devices. The older granite-cutting plants were those included in the extended investigation into the effects of silica dust of a known composition upon the health of the worker. This comprehensive investigation revealed the fact that granite workers are exposed to a dust recognized as highly injurious (containing about 35 per cent quartz) and of a potentially dangerous size, since practically all the dust examined was found to be less than 10 microns in diameter. Two hundred and twenty dust determinations made in the plants not using local exhaust ventilation, except in connection with indoor surface-cutting machines, revealed the fact that the majority of the workers were exposed to a large quantity of granite dust. A definite relationship was found between the magnitude of the dust exposure and the rapidity with which silicosis developed among the granite cutters. It also developed that an upper limit of allowable dustiness could be established, somewhere between 10 and 20 million particles per cubic foot of air. Hence, the next logical step was in the direction of the development of dust-removal devices of an efficiency and design that would keep the dust below this proposed standard.

Since excessive dustiness was found to be intimately connected with certain occupations, it was apparent that the remedial measure would depend upon the removal of dust at its source. Studies were made in certain granite-cutting plants that had made an attempt to remove the dust by the use of local exhaust ventilation, and the results of such investigations in two plants are presented in this paper. The system of ventilation in use at these plants is described in detail and the results of numerous exhaust velocity readings made at the working surface of the exhaust ducts are also given. The 44 dust determinations made in these two plants under normal operating conditions showed that in most instances

it is possible to keep the dust concentration in the air of the sheds below 10 million particles per cubic foot. Those instances in which the dust concentration was found to be greatly in excess of 10 million particles were usually due to improper use of the dust-removal devices and to the lack of maintenance of the ventilating system.

Since the studies made in the plants, using local exhaust ventilation in connection with dust-creating occupations, indicated that there was need of further knowledge concerning the proper maintenance and use of the present type of ventilation system, a brief experimental study was carried out in one of these plants. This experimental study was conducted chiefly for the purpose of determining the exhaust velocity necessary at the ventilating ducts to keep the dust down to a safe limit. These experimental tests were carried out in an unused portion of the shed, the same granite cutter creating dust for all tests by means of the various pneumatic tools in use in the industry. By means of an improvised blast gate inserted in the ventilating duct, it was possible to vary the exhaust velocity at the dust-removal hoods. Dust determinations were made at the breathing level of the operator and it was found that, irrespective of the type of pneumatic tool used, an exhaust velocity at the surface of the ventilating hood of 1,500 feet per minute (as measured by a calibrated vane anemometer) served to keep the dust exposure of the operator below 10 million particles per cubic foot of air. It was previously established that, by proper maintenance of the system of ventilation in use at these plants, it is possible to maintain exhaust velocities at the dust-removal hoods that will average 1,500 feet per minute. So that in proposing a velocity rate of 1,500 feet per minute it is felt that no additional burden is being placed on the shoulders of granite-cutting employers.

—C. K. D.

REPORT ON AN EXAMINATION OF EMPLOYEES AT THE STATE QUARRY, BOYA, WESTERN AUSTRALIA. *T. L. Tyrer. Med. Jour. Australia, June 29, 1929, vol. 1, pp. 861–863.*

The existence of a dust hazard in quarrying led to a medical examination of eighty-seven men employed in various processes; an X-ray film was taken of each. The rocks consisted of granite with 33 per cent. free quartz, and epidiorite with 2 per cent. The exposure to dust was considerable. Many of the men examined, however, had a history of previous dusty occupations, while of the rest the period of employment was too short for pathologic changes to develop. Signs indicative of silicosis were detected, but the circumstances mentioned were against definite conclusions.—E. L. C.

REPORT OF THE MINERS' PHTHISIS MEDICAL BUREAU FOR THE YEAR ENDED 31ST JULY, 1928. *Union of South Africa. Pretoria, Govt. Printer, 1929, pp. 67.*

Information of considerable value is presented in this report which is concerned, as usual, mainly with the compensation aspect of miners' phthisis. At last preventive measures are manifest in statistics; and a considerable decrease in the production of simple silicosis is recorded, due in large part to a decline in attack rates among miners of long employment. The incidence rate of the disease for each year of service worked is now definitely lower than during 1920 to 1923; while the average duration of employment among those affected is greater. The outlook is more encouraging than heretofore. In 1926 to 1927 there was a decrease of 126 cases as compared with 1925 to 1926; in 1927 to 1928 the decrease was 207. The group of miners who have only

been engaged after careful medical examination in their tenth year of service had an incidence rate of 0.9 per cent., as compared with 3 per cent. for men engaged of old without such examination, and 5.8 per cent. for such old time miners who have also worked in other mines. The figure for the first group is satisfactory, but the number of these miners at present is rather small. The average duration of underground service of those who became silicotic was 145 months as compared with 110 months in 1918 to 1919; but for men employed on machine drilling the period was 127 months as compared with 97 months in 1918 to 1919.

The prevalent type of silicosis has changed, as a result of the diminution in the influence of the dust factor and the increase in the relative importance of the tuberculous factor. Silicosis is not a simple dust fibrosis, but a fibrosis initially linked up with a latent element of tuberculous infection. Among the natives employed as miners, uncomplicated tuberculosis is endemic and provides a source of infection for Europeans. Hence control of tuberculosis among native miners is becoming relatively of increasing importance. Insistent effort by medical examinations on engagement and during work is required to lessen native tuberculosis, and by prevention of spitting underground to minimize the ejection of infective spray. Dust suppression by wet methods is proving disadvantageous; it increases humidity, assists spray infection, and fails to catch the fine dangerous dust, while allaying the coarser dust. Fine dust should be dealt with as a dangerous gas and be removed by ventilation. The report contains many statistical tables. The author, Dr. L. G. Irvine, deserves thanks for the clear way in which he has set forth the facts.—E. L. C.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

INDUSTRIAL DERMATOSES: THEIR CAUSATION, RECOGNITION, PREVENTION AND TREATMENT. *Proc. Roy. Soc. Med., June, 1929, vol. 22, pp. 1151–1166, Joint Discussion No. 7 (Dermatology, Epidemiology and State Medicine, pp. 115–130).*

J. M. H. MacLeod opened the subject with historical references from Celsus and Agricola, Pott and Willan, and pointed to the influence of compensation in disclosing the existence of cases.

S. Overton contributed the main paper. Out of 1,394 compensated cases of disease occurring during 1927 in factories, 879 were dermatitis, with a further 100 cases of chrome and epitheliomatous ulceration. Alkalies hold the first place as causative agents, macerating the keratin and horn cells of the skin more than acids of equal strength. Degreasing agents form an important causative group; sugar claimed 5 to 7 per cent. of cases, and bakers' dough 4 to 11 per cent.; but irritant agents are many and various. Recurrent attacks are frequent, imperiling the occupation of skilled workers. Bakers' dermatitis is a reaction to dough, which is hygroscopic. Sugar also is hygroscopic. Dyes are often troublesome; but "chemic" used to remove staining from the skin is

worse. The bulk of trade dermatitis is preventable by maintaining the integrity of the horn cells. Emollients should be applied before and after work; all irritants used should be completely removed several times per shift; inspection should insure early treatment of injuries, cleanliness of skin and clothes, and prompt treatment. Site is important in determining the etiology of a dermatitis; but oily overalls or wet shoes and stockings may affect nonexposed areas.

W. Dyson discussed predisposition to dermatitis and skin sensitization. The skin is an excretory organ, and sensitization is an anaphylactic state due to absorption of protein from inflamed epithelium. In dermatitis with no discharge the average blood sugar is high, but with discharge the blood sugar content falls. Prognosis for a first attack is good, but for a relapse poor.

N. H. Mummery claimed that the same cause acting on different skins may produce different results. An unduly dry and inelastic skin predisposes to dermatitis; similarly, persons having xerodermatous, hyperidrotic, or seborrheic skins should be excluded from handling food ingredients. Impunity experienced for years may suddenly break down, to be reestablished in a few months, for no obvious reason. Where flour is handled, fungus infections may occur; but bakers' eczema for the most part has originated in the past from lack of cleanliness. Seborrheic dermatitis is not uncommonly confused with industrial dermatitis.

W. J. O'Donovan held that the pendulum had swung too far toward suspecting an industrial origin in every case of dermatitis. Protracted occupational cases tend to heal rapidly under the golden ointment of compensation, instead of reacting to an itch-and-scratch reflex.

R. P. White looked on an unbroken cornuous layer of the skin as a protection against physicochemical action. He had no evidence of the existence of sensitization. Attention should be paid to physicochemical reactions and the qualities of the skin; sensitization might be left to the biochemist.

A. Parsons recounted fifty-two cases of hop dermatitis, an acute affection with papular erythema, vesication and pustulation, and extreme irritation. The juice of the hops or pollen may be responsible. The condition recurs season after season and passes away with cessation of exposure.

G. H. Lancashire gave an analysis of cases of dermatoses reported to insurance societies; 13 per cent. were not industrial; 21 per cent. were due to aniline dyes; 7 per cent. were among bakers; 12 per cent. were in painters, due to turpentine; 18 per cent. were in rubber workers, due to solvents and accelerators; the remainder were due to various causes.—E. L. C.

CANCER OF THE SKIN DUE TO OCCUPATION. TAR CARCINOMA. *W. J. O'Donovan. Arch. Dermat. and Syph., April, 1929, vol. 19, pp. 595–606.*

For abstract of this paper which was read at the International Conference on Cancer, London, July, 1928, see THIS JOURNAL (1929, vol. 11, Abstr. Section, pp. 29–30).

HOP DERMATITIS. *R. Lewith. Abstr. as follows from Arch. f. Dermat.*

u. Syph., 1928, vol. 154, pp. 345–351, in Bull. Hyg., Aug., 1929, vol. 4, p. 640.

Few references are to be found to hop dermatitis. The author could find only two (the well-known paper by W. J. O'Donovan in the *Lancet*, Sept. 20, 1924, p. 597, and that by C. J. Streich also in the *Lancet*, Oct. 4, 1924, p. 727). He describes three cases, with a good photograph of the hand of one of them showing a well-marked papular and vesicular dermatitis. As in O'Donovan's cases hypersensibility was present, recurrences having occurred in all. All three cases also occurred in women. One of them was peculiar in that four days after her discharge, she came back with an eczematous eruption all over the body. She declared that she had not been gathering hops, but had eaten some pears from trees close to the hop field.

Lewith tried to find out what part of the hop plant occasioned the eruption—the green leaves, the strobiles of the hop plant, or the glands at the base of the bracts (lupulin). These were placed in contact with the skin of the patient under an impermeable covering. After a few hours, irritation was felt where the strobiles had been placed and in twelve hours there was erythema with papules and vesicles. Similar contact with the green leaves caused no reaction, but with a 50 per cent. lupulin vaseline the same eruption developed. Controls similarly treated showed no reaction. The author concludes that these patients showed hypersensibility to hops, and that the idiosyncrasy was monovalent (only against hops). He could not say whether the idiosyncrasy was acquired or hereditary—perhaps both.

The sensitizing chemical substance, he believes, acted through external contact, for experimental administration of lupulin by the mouth produced no reaction.—T. M. L.

HYPERSENSITIVENESS TO LINSEED. *C. Sutherland. Abstr. as follows from Med. Jour. Australia, May 18, 1929, vol. 1, pp. 665–666, in Jour. Am. Med. Assn., July 20, 1929, vol. 93, p. 240.*

Routine investigation of allergic patients made by Sutherland has shown that linseed (flaxseed) is frequently a cause of symptoms.—K. R. D.

EXPERIMENTS ON THE NATURE OF THE CARCINOGENIC AGENTS IN MINERAL OILS. *C. C. Twort and J. D. Fulton. Abstr. as follows from Jour. Path. and Bacteriol., Jan., 1929, vol. 32, pp. 149–161, in Bull. Hyg., Sept., 1929, vol. 4, pp. 751–752.*

Continuing their investigations on carcinogenic mineral oils (petroleum and shale) in an endeavor "to isolate, or at least to gain an insight into the nature of, the chemical substance or group of chemical substances responsible for the malignant action on the skin," the authors attempted first to concentrate the active agent of oils. A variety of methods was used (fractional distillation, extraction with chemical reagents, oxidation, reduction, silica gel adsorption, irradiation, etc.), and tests of the tumor provoking properties were made by applications to the skin on the backs of mice. Results at variance with previous observations were obtained with fractional distillates, there being no obvious concentration of the active agent in the higher boiling fractions. Concentration of the carcinogenic agents was,

however, effected by extraction of the oils by means of picric acid in conjunction with methyl sulphite or methyl sulphate. From a consideration of the chemical reactions involved, the authors are of opinion that it is to benzenoid hydrocarbons that certain mineral oils owe their carcinogenic properties. Treatment of the oils with sulphuric acid led to almost total abolition of their carcinogenic activity, and similar results were obtained by the adoption of methods of oxidation and reduction.—L. M. H.

OBSERVATIONS ON THE REACTION OF THE SKIN TO OILS AND TARS. *C. C. Twort and J. M. Twort. Abstr. as follows from Jour. Hyg., 1928, vol. 28, pp. 219–227, in Bull. Hyg., Sept., 1929, vol. 4, p. 752.*

The authors describe the experiments conducted and the conclusions at which they have arrived from a study of the reaction of the skin of mice to applications of oils and tars of varying carcinogenic power. More than 20,000 mice were used and the skins of some 3,000 were examined microscopically. Hyperplasia of the surface epithelium and subepithelial inflammation were the most obvious and constant changes observed. Epithelial hyperplasia resulting from the action of many other agents may not proceed to malignant degeneration, but the authors believe that, even when the irritant has been removed, the hyperplasia induced by carcinogenic agents is a very important part of the cancerous process. A marked tendency to the formation of multiple epitheliomas was noted, and also a tendency to regression of the tumor if ulceration occurred. There was no instance of the development of a sebaceous carcinoma or a sarcoma; metaplasia of the squamous-celled carcinoma to a spindle-celled type, however, was seen. In those mice in which epithelial hyperplasia had been induced by painting with certain reagents, *e.g.*, oleic acid, there appeared to be a hypersensitiveness of the painted area to subsequent applications of carcinogenic agents, tumors developing on an average four weeks earlier than in the control animals. The results obtained by varying the number and frequency of the applications of tar were also studied; in general it was found that, within limits, the number of animals which developed tumors increased with the number of applications, while those in which the frequency of painting was increased responded earlier than did the controls. Although the percentage of malignant tumors induced varied with the substances employed in each experiment, no differences in the actual degree of malignancy were found.—L. M. H.

CANCER AND OTHER DISEASES OF THE SKIN CAUSED BY MINERAL OILS. *J. H. Sequeira. Abstr. as follows from Kenya and E. African Med. Jour., 1929, vol. 6, pp. 18–23, in Bull. Hyg., Sept., 1929, vol. 4, p. 752.*

Drawing attention to "one small aspect of industrial hygiene which may be of importance in view of the rapidly extending use of the mineral oils for locomotion, for power, for illumination, and for the lubrication and cleaning of all types of machinery and as a larvicide in antimalarial campaigns," the author reviews briefly the evidence that has accrued of the

carcinogenic properties of mineral oils with which workers in various occupations come into contact.

Prophylactic measures against skin cancer and other dermatoses in such workers consist in absolute cleanliness of body and clothing (perhaps difficult to insure in the African native workman), the application of castor oil to exposed surfaces, and medical inspection every three months, particular attention being directed to the scrotal and inguinal regions, where the majority of these lesions arise. Every tumor that develops, no matter how small, should be excised, with a wide margin of adjacent unaffected skin.—L. M. H.

Oil Acne in a Turner. *L. M. Pautrier and Diss. Bull. Soc. franç. de dermat. et syph., June, 1929, vol. 36, pp. 486–489.*

Oil acne is reported in a man employed at a motor car works and exposed to crude paraffin. A number of others at the same factory were said to be affected. The condition attacked particularly the forearms as high as the shoulders; but the back and outer sides of the thighs were also concerned, as a result of overalls becoming soaked with paraffin. The paraffin sets up a reaction which results in plugging up the orifices of hair-sebaceous follicles with a mass of horny cells. Beneath the plug forms a cyst which, if infected with staphylococci, becomes a purulent boil. After discharging and healing, a scar is left. These numerous scars give the skin a worm eaten appearance. The area around the acne plugs is red and inflamed. Withdrawal from work is followed by improvement; otherwise the condition is obstinate. Prevention lies in altering the paraffin used, or in moving susceptible men to other work.—E. L. C.

Paraffin Not Productive of Cancer. *H. B. Wood. Abstr. as follows from Jour. Cancer Res., March, 1929, vol. 13, p. 97, in Arch. Dermat. and Syph., Sept., 1929, vol. 20, p. 365.*

Pure paraffin is inert and in no way deleterious to the health of persons using it. High temperature coal tar which gives the greatest proportion of cancers is poor in paraffin, and the tars containing the most paraffin produce no experimental cancers. Tumors from oil, liquid petrolatum or paraffin injections are not neoplasms but foreign body granulomas due to the long-continued action of a low grade chemical irritant. Dermatitis and folliculitis in paraffin workers is not due to pure paraffin.

Pitch Cancer in Briquette Makers in Coal Factories of Baden and South Wales. *Teutschlaender. Abstr. as follows from Ztschr. f. Krebsforsch., Jan. 18, 1929, vol. 28, pp. 283–300, in Bull. Hyg., Sept., 1929, vol. 4, pp. 752–753.*

A full account of pitch cancer derived in part from the observations of Legge, Bridge, Henry, and Sladden in England and Wales, and in part from the author's own observations in Baden. The author has observed five cases of the disease and promises publication of further material. The parts of the body affected by warts or cancers in these cases were eyelid, brow, cheek, chest, penis, forearm (one each), lip two, ear three, scrotum five. Good photographs of some of

these cases are given. One case was observed of cancer in a man who had been only seven years in the occupation and another in a man 25 years old who had been employed for eleven years. A full account is given of the conditions under which the men work and preventive measures are discussed at length. The system prevailing at Mannheim whereby pitch workers receive 15 per cent. extra wages on account of the danger of the work is condemned, as it leads men to pursue the occupation as long as possible. The author suggests that the wages should rather be specially low, so that the workers might hasten to obtain other employment. Among the practical measures for protection discussed are:

1. Avoidance of dust by closed apparatus or moistening of the pitch.
2. Frequent change of occupation.
3. Nonemployment of men who have delicate skins, or are unwilling to wash, or have already developed warts or cancers.
4. Protection of the skin by clothing, hats, goggles, ointments (clay, which is used frequently in German works, is unsuitable as it does not adhere when dry).
5. Avoidance by workers (*a*) of handling or rubbing the moustache, cheeks, and eyebrows, which are common sites for tumors; (*b*) of transference of pitch to the scrotum by the fingers during micturition.
6. Washing facilities and change of clothes.
7. Medical inspection.
8. Cessation of work in very hot weather, as sweating is held to promote the contact of pitch with the skin.

—E. L. K.

Skin Lesions among Tar Workers. *H. B. Wood. Abstr. as follows from Jour. Cancer Res., March, 1929, vol. 13, p. 54, in Arch. Dermat. and Syph., Sept., 1929, vol. 20, p. 364.*

The author's investigations led him to the conclusion that the production of tar papillomas and epitheliomas is due to chemical rather than physical irritation and that only the high temperature coal distillates contain carcinogenic substances. Anthracene oil is the principal high temperature content of coal tar. Petroleum tar and low temperature distillate tars are thought not to possess irritant action. The heavy oils yielded by the high temperatures in coke making produce pustular skin lesions more readily than the low temperature light oils but probably do not produce papillomas. The phenol oils cause dermatitis in susceptible skin. Observations conducted at gas works, coke by-products plants, briquette factories, and tar paper and roofing paper factories failed to disclose evidence of occupational cancer, but disclosed tar warts, without epitheliomatous changes, among handlers of coke tar. Among the latter the incidence of warts was high. No tar warts were observed in gas works producing water gas nor in briquette factories.

An Appliance to Protect the Hands of the Radium Worker. *H. Mackay. Canadian Med. Assn. Jour., Sept., 1929, vol. 21, p. 309.*

Dr. Mackay describes, with illustrations, an appliance in which a radium plaque which is to be used topically is invested with an oiled silk or rubber dam to protect the hands of the operator from the degenerative changes in the skin which may result from repeated exposures to small doses of radium rays.—M. C. S.

Traumatic Keratitis as Industrial Injury in Sugar Factories. *R. Thiel. Abstr. as follows from Klin.*

Monatsbl. f. Augenh., Dec., 1928, vol. 81, pp. 835–838, in Am. Jour. Ophth., June, 1929, vol. 12, p. 531.

Three laborers had been occupied in washing sugar beets in waste water. They suddenly noticed burning and lacrimation of both eyes, while there was an irritating odor which reminded them of horse radish. The affection consisted in vesicular detachment and defects of the corneal epithelium within the palpebral fissure. Under dionin and heat the symptoms disappeared after three days, without permanent damage. Although hydrogen sulphide could not afterward be proved in the material worked upon, it is very probable that it must be regarded as the etiologic element. In former similar observations no ocular affection was noticed when fresh water was used for washing the beets.

PREMATURE PRESBYOPIA IN LABORERS EXPOSED TO THE OPEN FURNACE. *R. Lederer. Abstr. as follows from Klin. Monatsbl. f. Augenh., May, 1929, vol. 82, pp. 656–661, in Am. Jour. Ophth., Aug., 1929, vol. 12, pp. 707–708.*

In examining workers in glass factories, Lederer found that those working before open fires needed presbyopic glasses earlier, and stronger ones than corresponded to their ages. He ascribes this to the nature of their work, not to premature age of the population of this district, as the comparison with laborers at other occupations in the same region proved. There were no visible changes in the lens, and the limitation of accommodation is ascribed to the damaging influence of radiating energy upon ciliary body and ciliary muscle.

COMBAT AGAINST NOISE. *Foreign Letter (Berlin), Jour. Am. Med. Assn., June 22, 1929, vol. 92, p. 2119.*

The Deutsche Gesellschaft für Gewerbehygiene (German society of industrial hygiene), which has formed a special committee for combating impairment of hearing due to industrial noise, has published and distributed a pamphlet on the causes and prevention of impaired hearing and on industrial noise, according to which:

1. Noise can impair hearing by its intensity as well as by its duration; noise is transmitted not only through the air but also through the walls and floors of the working rooms. A single strong sound impression, such as a whistle, explosion or stroke, is especially injurious if it occurs suddenly and unexpectedly.

2. The noise injures the most sensitive and vital parts of the organ of hearing; namely, the auditory nerve endings in the cochlea.

3. Not every human ear is injured by loud continual industrial noise. The greater the power of resistance of the organism, and the healthier the organ of hearing, the less harmful is the effect of noise.

4. An injury of the ear that is caused by a sudden and extremely loud sound (whistle, detonation) is noticed immediately by the injured person. A sensation of pressure is noticed, a ringing sound and earache develop; a strong blast of air sometimes causes bleeding and discharge of fluid from the ear. Impairment of hearing caused by continuous, moderate occupational noise develops gradually and is at first hardly noticed. In the beginning, many workers do not feel the influence of the noise of the workroom. Examination by an ear specialist often reveals the impairment of hearing in such persons who are not aware of their injury.

5. In case of impaired hearing, the individual is at first incapable of perceiving high tones, as tinkling, whistling, and the tones of a violin. In case of prolonged duration of injurious effects of noise, the degenerative process extends to the other

auditory cells which serve for the perception of lower tones.

6. Difficulties of hearing which are due to a cold (causing swelling of the eustachian tube) or by accumulation of ear wax, or plugs formed by the dust of the working materials, should not be confounded with essential impairment of hearing.

7. Syphilis and other infectious diseases often lead to disorder of the organ of hearing. Excessive drinking and smoking can reduce the power of resistance of the auditory nerves against injurious noises.

8. Stopping the ears with plugs of cotton or of flax fiber is not sufficient protection against noise in workrooms. The ears should be protected regularly with compact plugs made of gauze saturated with petrolatum or wax. If the floor vibrates, straw, cork, or rubber soles or felt shoes may be helpful; for kneeling, felt mats may be used.

9. Apprentices or young workers, if coming from families with hereditary ear troubles, should not work in noisy factories. If they suffer from diseases of the ear, they should consult an ear specialist before entering such employment. When beginning work in an especially noisy plant, an examination by an ear specialist is advisable. During the period of employment, the examination should be repeated from time to time.

10. A worker who finds that a noisy occupation impairs his hearing, or is detrimental to his general condition, should choose different work.

11. In all cases of beginning impairment of hearing, an ear specialist should be consulted. This should not be postponed until serious disturbances become noticeable, such as ringing in the ears or attacks of dizziness. The earlier treatment is begun, the better is the prospect for improvement or recovery.

12. Endeavors that strive to limit industrial noise should be promoted and supported. They include the proper distribution of machines, and suitable contrivances for the suppression of noise. Relaxation in quiet surroundings when away from work is the most helpful means of preventing ear troubles.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

SEVENTH ANNUAL REPORT OF THE SAFETY IN MINES RESEARCH BOARD AND THE HEALTH ADVISORY COMMITTEE FOR 1928. *H. M. Stationery Office, 1929.*

An account is given of progress during the year of researches undertaken either directly under the Board or with its financial assistance. The funds come mainly from grants made out of the Miners' Welfare Fund. The subjects of research, which are treated rather more fully than in previous annual reports, include problems relating to coal dust and fire damp explosions, the spontaneous combustion of coal, the safe use of electricity and explosives, safety lamps, falls of ground, wire ropes, mine rescue apparatus, and mine temperatures. Work especially related to health was concerned with the occurrence of silicosis in the sandstone industry and among slate workers. Particular attention was paid to radiographs of chests affected by various dusts. Dangers from inhaling hematite dust were investigated; and an inquiry was continued into the influence of dusts upon animals. Progress was also made with dust trapping devices, one of which is now approved for use underground. The relations between absenteeism and atmospheric conditions underground were matters for research and a special report. The activities of the newly appointed medical inspector of mines were of great value to the work of the Committee.—E. L. C.

THE SUPPORT OF UNDERGROUND WORKINGS IN THE COALFIELDS OF LANCASHIRE, CHESHIRE, AND NORTH WALES. *Safety in Mines Res. Board, Paper No. 55. H. M. Stationery Office, 1929.*

The Committee of the Safety in Mines Research Board, which is studying methods of preventing accidents from falls of roof and side, has been carrying out, in addition to experimental work, a survey of colliery practice as regards the support of underground workings in order to call attention to the best methods and suggest improvements where possible. The Committee has now published its fifth report. The Committee's first four reports related to the coal fields of South Wales, Scotland, the East Midlands, and the South Midlands.

The fifth report, like the earlier ones, is liberally illustrated with numerous sketches and plans showing the methods of working and of supporting the roof. In addition to a summary of the recommendations, the report includes, among the appendices, descriptions of a number of common accidents and notes as to ways in which they might have been avoided. —E. L. C.

WOMEN AND CHILDREN IN INDUSTRY

THE EMPLOYMENT OF WOMEN IN JAPANESE INDUSTRY. *I. F. Ayusawa. Internat. Labour Rev., April, 1929, vol. 19, pp. 503–521.*

Two previous articles dealt with statistics; this one describes hygiene and safety, maternity protection, and the dormitory system. Factory Acts lay down reasonable standards, but compliance is inadequate. Japan is rapidly changing over from agriculture to industry; it has but narrow, unfertile land to support a congested population. Until such work is abolished in 1933, women may be employed in mines underground. Japanese mines have high accident rates; thus 903 persons, in 1924, were killed out of a total of 305,252 miners. Most employed women work in textile mills which absorbed 812,000 in 1926, out of a total of 938,928 industrial women. About 7.5 per cent. of women in factories employing 500 or more workers suffered sickness from lung trouble which represents 23.5 per cent. of all sickness; digestive disorder accounted for 22.9 per cent.; beriberi claimed 11 per cent. of the sick men and women, and trachoma 2 per cent.

No woman may be employed for a month before or for six weeks after confinement. Day nurseries are provided at factories; they often are only dirty pens, but clean, up-to-date crèches are to be found at big city factories. Labor is obtained from far-away villages and brought to the rapidly increasing factories, where it is housed in dormitories; 530,443 women, mostly textile workers, are so accommodated. Dormitories are slight wooden structures with plenty of air, but difficult to heat. Overcrowding exists; six girls to a floor space 9 feet by 9 feet is reported. No beds are used in Japan; bedding consists of quilts and mattresses stored in a closet by day and spread on the sitting room floor by night. Sometimes night and day shifts use the same quilts alternately. Food costing about 8d.

per head per day is served; it consists of rice, vegetables, fish, and pickled radish or cucumber. The Japanese do not eat meat and dislike milk and butter. A code of regulations, which applies to dormitories, calls for washing accommodation with towels and toilet rooms, separate bedding, and single story buildings with doors opening outward. The occupants of dormitories must be medically examined twice a year.—E. L. C.

SOME SOCIAL AND ECONOMIC ASPECTS OF HOMEWORK. *N. Y. State Dept. Labor, Special Bull. No. 158, 1929, pp. 40.*

This report, based on an investigation covering 670 home workers—500 in New York City and 170 in the remainder of the state, is an attempt to present the worker's point of view on home work and to discuss hours of work in relation to earnings. It also shows the relation of the home work earnings to the total family income, and in turn compares the total family income with standard budgets accepted for American families.

"The Bureau of Women in Industry presents this report as one of a series on this subject, with the idea that industrial homework must be understood and approached from all angles before there can be a real solution of the homework problem."

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

THE PRESENT POSITION OF THE HYGIENE OF THE ATMOSPHERE. *W. Liesegang. Abstr. as follows from Klin. Wchnschr., 1928, vol. 7, pp. 463–465, in Chem. Abstr., Aug. 20, 1929, vol. 23, p. 4003.*

The use of tar is advocated for keeping down street dust. There is no definite proof that smoke has any influence on health. Carbon monoxide in amounts present in Berlin has a pronounced effect on the health of city dwellers.—P. D.

THE POLLUTION OF THE AIR BY SMOKE. *J. S. Owens. Abstr. as follows from Mech. World, 1929, vol. 85, pp. 348, 364–365, in Chem. Abstr., July 10, 1929, vol. 23, p. 3289.*

A discussion of some aspects of the smoke pollution problem not so familiar to engineers; the composition of domestic soot and of London air; daylight and sunlight lost due to smoke haze; methods adopted for measuring degree of pollution of air; effect of wind velocity upon concentration of impurity; and possible remedies.—P. D.

A PHOTOELECTRIC SMOKE RECORDER. *E. H. Vedder. Abstr. as follows from Elec. Jour., 1929, vol. 26, pp. 199–201, in Chem. Abstr., Aug. 10, 1929, vol. 23, p. 3632.*

A beam of light is projected through a stack into a lens which concentrates the light on a photoelectric cell. The amplified response then actuates a recording instrument. A double box construction makes the units weatherproof. Air is drawn in at the vent at the rear of the unit and around the internal box, which is kept covered,

and into the holes in the pipe connecting the internal and external boxes. This air flows through the pipe on which the units are mounted on the front of the internal box. Photographs are shown of the amplifier and control unit, and of the light source unit, and graphs show the schematic arrangement of the smoke detector, characteristics of the photo-cell and of the amplifier tube, the wiring of the smoke recorder, sections of a smoke recorder chart, and the graphic instrument which keeps a continuous record of smoke density.—P. D.

LIGHTING AND THE HYGIENE OF THE EYE. *C. E. Ferree and G. Rand. Abstr. as follows from Arch. Ophth., July, 1929, vol. 2, pp. 1–26, in Am. Jour. Ophth., Sept., 1929, vol. 12, p. 790.*

The student of the subject of lighting and the hygiene of the eye is confronted with three major problems: (1) determining the factors which are likely to affect the eye; (2) discovering those functions of the eye which are most apt to be affected; (3) devising satisfactory means for measuring and testing these results. Concerning the first of these, two different sets of elements must be considered, those pertaining to light itself and the distribution of the light. Elements in the former are wave length and composition, purity and intensity, and, dependent upon them, hue, saturation and brightness, in the latter, evenness of illumination, evenness of surface brightness, diffuseness of light, and the angle of incidence. The functions of the eye which must be considered are (*a*) acuity of vision, (*b*) speed, (*c*) power to sustain acuity, (*d*) fatigue, (*e*) discomfort, (*f*) the near point, (*g*) relative accommodation.

Short wave lengths are handled by the refractive media with the least diffraction, but the wave lengths in the mid-region of the spectrum give the retina the best discrimination. For small visual angles and low intensities, speed of discrimination is superior for black on white. Intensity of white light increases the power of the retina to discriminate detail. High intensities stimulate mental activity. A brilliant image from an artificial source of light is most harmful, for it causes sharp contraction of the pupil and reduction of one-half in diameter of the pupil cuts down the amount of light by 75 per cent., produces a blinding effect by irradiation, and finally may result in damage to the retina.

Eyestrain results from the attempt, involuntarily made by the eye, to clear up the vision under disadvantageous circumstances of illumination. Myopia is a frequent result of bad lighting. In conclusion the authors point out that the anatomic changes produced during periods of eyestrain may be related to glaucoma, cataract, and so on.

This paper is immensely interesting and should be read in its entirety.

MODIFICATION OF WEBER'S INSTRUMENT FOR DETERMINING NATURAL ILLUMINATION. *F. P. Leusden. München. med. Wchnschr., Nov. 30, 1928, vol. 75, p. 2052.*

Leusden describes and illustrates an apparatus for determining the natural illumination on the working plane from the angle of incidence and the angles formed by lines joining the upper and

lower window edges with the horizontal plane passing through the point at which the illumination is to be measured.—C. P. Y.

PROGRESS IN METAL MINE VENTILATION. *D. Harrington. U. S. Bur. Mines, Information Circ. 6136, May, 1929, pp. 18 (mimeographed).*

This is a discussion of recent literature and current practice in mine ventilation with regard to heat and moisture, dusts, gases, and fires encountered in mines.

Many methods of improving working conditions underground have been tried and the most potent remedy now available is, in the author's opinion, the continuous circulation of large volumes of fresh air from the surface to and past the places where the men work. The greatest benefit of mechanical ventilation results from lowered temperature and humidity. Attention is called to recent fatalities from heat stroke in the deep gold mines of South Africa. These occurred in air which was practically saturated at temperatures between 85° and 91°F. Such adverse air conditions are to be found in many of the deep metal mines of the United States.

Mechanical ventilation is of great value also in removing dusts, smokes, and explosive gases. Moreover, it saves considerable time by allowing the miners to return to their places of work more promptly after the blasts.

Although little is heard of health hazards from breathing dusts in mines, there continues to be much silicosis and other kindred diseases. The belief that only dusts containing considerable amounts of free silica are harmful to breathe is a dangerous fallacy, as was indicated in the study on the inhalation of dust by cement workers made by the United States Public Health Service.

Metal mines are not immune from fire hazards, as some mining men believe. In the recent Hollinger fire in northern Ontario, thirty-nine men lost their lives from poisonous fumes given off from burning boxes, sawdust, and the like, which had been thrown into a nearby stope. Practically all metal mines contain such combustible matter, and unfortunately most of them still continue to use open lights, in spite of the fact that open lights are not only dangerous but also less efficient and less economical than the modern type of storage battery electric cap lamps.—C. P. Y.

VENTILATION IN CONNECTION WITH APPLYING COATING AND FINISHING MATERIALS TO AUTOMOBILES BY THE USE OF ATOMIZERS AND COMPRESSED AIR. *J. H. Vogt. N. Y. State Dept. Labor, Indust. Hyg. Bull., Feb., 1929, vol. 5, pp. 29–32.*

A brief article with excellent illustrations.—P. D.

THE DISPOSAL OF OIL FIELD BRINES. *L. Schmidt and J. M. Devine. U. S. Bur. Mines, Rep. Investigations, Serial No. 2945, June, 1929, pp. 17 (mimeographed).*

The authors report their findings in an investigation of the four general methods now used in the disposal of oil field brines.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

REPORT ON AN INVESTIGATION REGARDING THE EMISSION OF FUMES FROM ARTIFICIAL SILK WORKS. *T. L. Bailey. Ministry of Health. H. M. Stationery Office, 1929.*

The viscose process is responsible for 80 per cent. of artificial silk; it causes unpleasant smells outside the works, due to hydrogen sulphide and other sulphur compounds produced when the thread is formed. These compounds cannot be satisfactorily deodorized or absorbed; they are caught as formed and extracted from the workroom, but pollute the air around the factory, even though discharged from a chimney 350 feet high. The effluents may also evolve these fumes when one containing free acid runs into one containing sulphides; neutralization of acids and precipitation of sulphides is required. No evidence of ill effect upon the health of the community was found, although amenities have been interfered with. A hazard from carbon bisulphide may arise in the churning process. Injury to the fingers and conjunctivitis may occur to operatives at spinning. These last-named hazards can be controlled. —E. L. C.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

VOCATIONAL SELECTION IN TWO FIRMS. *V. Moorrees and E. Stevenson. Jour. Nat. Inst. Indust. Psychol., July, 1929, vol. 4, pp. 367–372.*

At a large chocolate factory more than 1,000 individuals are tested each year. The tests which are given to factory workers are all performance tests. Some of them are similar to well-known paper tests, but they are carried out by performance. For instance, in the cancellation test, the sheet of paper is replaced by a board with metal insets of different shapes, and the candidate is required to tap only the circles with a metal pointer. An electric circuit records the number tapped and also the number of errors. In a test for precision and steadiness of movement, the candidate has to trace a metal pointer rhythmically round a metal trough without touching the edges. Before these and other selection tests were started at the factory, the proportion of misfits ranged from 20 to 25 per cent. It now ranges from 1 to 5 per cent.

At the stores of a retail distributor where 6,000 people are employed, about 2,000 juniors under 18 years of age were tested per year during 1925 to 1927. Of the 750 children tested at one of the stores, about 40 per cent. were engaged as salespeople, cashiers, etc. The tests for salesmanship are a measure of (1) ability to understand and carry out instructions; (2) memory for detail, with particular reference to the location of merchandise, and to spoken orders and inquiries; (3) deductive and reasoning powers; (4) accuracy and quickness in mental calculations; (5) tact and courtesy in handling customers. In consequence of these tests, a much better type of employee is now obtained.—H. M. V.

RESULTS FROM SOME NEW TESTS OF PRACTICAL ABILITIES. *W. Vickers and V. H. Hoskin. Brit. Jour. Psychol., 1929, vol. 20, pp. 66–81.*

The tests of practical ability employed were evolved in order to carry out vocational guidance experiments on workers engaged in file cutting and in tool making. The tests were tried out first on 115 schoolchildren 13 years of age, and then were given to workpeople. The obstacle test consisted of a board on which were mounted a series of obstacles graded in difficulty, and through these obstacles the subject had to maneuver a wooden object. The balancing test consisted of an irregularly weighted metal plate, which had to be balanced on a pivot. Other tests consisted of an inverse formboard test, a moving line test, area sorting, aiming, substitution, reaction time, and cube construction.

The correlations between the results of the tests and the foremen's estimates were usually low, and sometimes negative, owing to the complicating factor of age. These ages varied from 15 to 52, and, practically speaking, experience varied with age. On plotting out ability to perform tests in relation to age, it was found that in every instance ability increased with age up to 25 or 30, and then decreased with increasing age. It was concluded that whereas practical *skill* (in file cutting and tool making) improves continuously with experience, practical *capacity* reaches a maximum and then declines. This conclusion is at variance with the generally accepted opinion that intelligence reaches its height at the age of 16 or less; but the usual intelligence tests are mainly verbal, and perhaps the predominant factor measured is facility in dealing with meanings *via* words, while the tests used in the present investigation did not need the facile use of words.—H. M. V.

PERSONAL FACTORS IN RELATION TO THE HEALTH OF THE INDIVIDUAL WORKER. *C. M. Campbell. Ment. Hyg., July, 1929, vol. 13, pp. 483–495.*

A study of the emotional and instinctive factors which determine behavior, now recognized as essential in any medical examination, can be applied with good effect also to problems of physical and mental maladjustment in industry. By citing individual cases, Dr. Campbell shows how emotional tension, lack of recreation, and a narrow and restricted life may explain physical symptoms, apparently originating from other causes, and how certain states of mind may prolong the period of incapacity of a worker who has suffered industrial injury.—M. G. P.

THE EFFECTS OF CONTINUOUS WORK UPON OUTPUT AND FEELINGS. *A. T. Poffenberger. Abstr. as follows from Jour. Applied Psychol., 1928, vol. 12, pp. 459–467, in Bull. Hyg., Dec., 1929, vol. 4, pp. 975–976.*

An investigation is recorded in which a number of subjects performed four forms of mental work, composed of continuous addition, sentence completion, judging compositions, and intelligence tests. After each spell of work the subject recorded how he felt, on a scale of seven steps, from extremely good to extremely tired. No positive relationship between changes in output of work and changes in the

feelings experienced were found. Thus, with the intelligence test, output steadily increased while the feelings steadily got worse; on the other hand, with addition, the output diminished and the feelings also steadily got worse. Improved efficiency due to practice would not appear to be reflected in improved feelings. But at least a suggestion was found that those showing greatest falling off in output also exhibited the greatest downward change in feelings, while those with the least falling off in output exhibited the least change in feelings.—E. L. C.

THE HUMAN FACTOR IN SUBSTATION OPERATION. SPECIFICATIONS AND TESTS FOR SUBSTATION OPERATORS. *M. S. Viteles. Personnel Jour., Aug., 1929, vol. 8, pp. 81–113.*

"This paper reports a battery of tests adapted and devised for the selection of electrical substation operators. The chief duties of these operators after careful job analysis and the plotting of a job psychograph were defined as (1) the manipulation of numerous and extremely complicated apparatus for transforming and regulating voltage, etc.; (2) the reading of meters; and (3) care of the station and its equipment. In determining methods of testing aptitudes for this job, the duties under (3) were distinguished from those under (1) and (2); and normal conditions of operation were sharply distinguished from emergency conditions. Seven specific essential abilities were isolated after careful analysis; and, after experimentation ten tests given in three series were adopted for selective purposes: Series A, five tests of paper and pencil type; Series B, four performance tests; Series C, switching control test to measure ability to operate under emergency conditions. A validation of the latter series is not complete. The paper confines itself to the results of Series A and B. Eighty-four operators were tested and scored, and for statistical purposes were divided into three groups, Best, Average, and Poorest. Test scores were compared with the number of operating errors (the latter was disclosed to be in itself a criterion for classification), and statistical reliability computed. The tests are presented as having justified their use for the selection of assistant operators to be trained in substation operation."

THE VISUAL STANDARDS DESIRABLE FOR MARINERS AND RAILWAY OFFICERS. *J. Barrett. Abstr. as follows from New Zealand Med. Jour., 1929, vol. 28, pp. 161–165, in Bull. Hyg., Nov., 1929, vol. 4, pp. 950–951.*

Sir James Barrett draws attention to danger to the public of the "constant semi-political agitation respecting standards of vision for those employed in navigation and in railway services." There can be no doubt that for the protection of the lives of passengers uniform standards should be set and proper methods of examination indicated of the eyes of all such employees. Barrett thinks that ophthalmic surgeons have, in the past, neglected the light sense in the examinations. Generally the examination of the visual field will reveal any gross defect of the light sense, sufficient for the purpose of the examination; color vision may be tested by the Edridge Green lantern and, if doubt remains, by the Ishihara test. The candidate who passes these

tests may be accepted safely. No candidate with imperfect color vision should be taken.

The question of central acuity is rather more doubtful; it is true that for many purposes an acuity of less than normal is sufficient, but Sir William Abney showed that defective focusing (errors of refraction) increased the difficulty of recognizing colors; there is always a distance beyond which colored lights are seen but their color is not recognized. In the presence of errors of refraction the diffusion circles, by spreading the light over an abnormally large area, diminish the saturation of the color and lessen the distance at which it can be recognized.

Since there is no lack of entrants to these services, acuity should, on entrance, be normal, 6/6, in each eye. Since also the habitual performance of duties makes it possible to perform them with less visual acuity, employees already in the service may be retained so long as their vision does not fall below 6/12. Sir James thinks that examination of the vision of pilots and railway men of Class 1 (engine drivers) should be made annually up to the age of 60, and every six months after that.

"The examination must include mydriasis and scrutiny of the fundus and media." Having in mind the risk of glaucoma, not all ophthalmic surgeons would agree to this last suggestion.—H. G.

A New Visual Test Card. *A. Cowan. Am. Jour. Ophth., July, 1929, vol. 12, p. 588.*

A card is discussed which is arranged with letters previously described in the *American Journal of Ophthalmology* (Aug., 1928, vol. 11, p. 625). The letters are widely spaced so that each stands out as an individual test object, in order to eliminate fatigue as much as possible. The graduation follows very closely the geometric progression proposed by Green, but the distances are so chosen that the Snellen fraction may be written in round numbers.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

State Laws and Local Ordinances Regulating the Street Work of Children. *E. A. Merritt. U. S. Dept. Labor, Children's Bur., Chart No. 15, 1929, pp. 29.*

This is a tabular summary of the regulations in effect in the United States and does not lend itself to abstraction. Interested readers are therefore referred to the original.—M. C. S.

Compensation Cases Settled Analyzed by Industry, 1927. *Wisconsin Labor Statistics, Bull. No. 17, March 20, 1929, pp. 6.*

This report consists of two tables—one comparing cases settled during 1922, 1923, 1926, and 1927, in various groups of industries; the other giving number of accidents, total days lost, and compensation cost by industries for cases settled in 1927.

Expert Committee on Compensation Fund for Cases of Occupational Diseases. *Documents et Études, No. 1, pp. 54. Brussels, 1929.*

Compensation for occupational diseases was legally granted in Belgium in 1927. A central fund is established to defray the costs, and an expert committee is appointed to determine both the list of compensable diseases and the contributions to be paid into the fund by the employers concerned. Up to the present, the list includes only lead poisoning, mercurialism, and anthrax. The Committee reports that in the first year compensation was awarded on account of (*a*) lead poisoning: to 5 smelters of zinc and lead for temporary incapacity and to 3 for permanent incapacity, to 3 painters for temporary and to 2 for permanent incapacity, to 4 white lead corroders for temporary incapacity, to 2 printers for temporary and to 1 for permanent incapacity, to 1 vitreous enameler for temporary and to 1 for permanent incapacity, and to 1 lead pipe maker for permanent incapacity; (*b*) 2 fatal cases of anthrax among tanners, and 4 which recovered—3 among woolsorters and 1 from horsehair. No case of mecurialism came up for review.

An interesting summary is given of the working of compensation for diseases in other countries. Data for France are quoted in detail for lead poisoning for the years 1921 to 1926, including 6,065 cases, and for Great Britain since 1900. Similar information is given for mercurialism. For anthrax, records of other countries are also quoted; these include Italy, Norway, Sweden, Germany, and Russia. The industries contributing vary greatly in different countries: Thus in Great Britain wool claimed 52 per cent. of 1,342 cases during a period of twenty-three years, hides and skins 29 per cent., and horsehair 14 per cent.; but in France wool claimed 25 per cent. of 443 cases during twelve years, hides and skins 59 per cent., and horsehair 7.6 per cent.; while in Germany wool claimed only 0.8 per cent. of 532 cases during eleven years, hides and skins 67 per cent., and horsehair 21 per cent. In each country the infected material is nearly all imported and the country of origin is given. Information is stated as to steps taken to disinfect the materials in various industrial countries.—E. L. C.

Occupational Diseases and Social Legislation. *Foreign Letter (Berlin), Jour. Am. Med. Assn., Aug. 10, 1929, vol. 93, p. 473.*

Social insurance against occupational diseases was first adopted as an inherent part of insurance against accidents by the decree of May, 1925. This decree, which brought only a small proportion of the existing occupational diseases under the protection of insurance, did not measure up to expectations. The new Act of Feb. 11, 1929, entitled "A decree concerning the extension of accident insurance to occupational diseases" introduces many changes in the previous law.

The most important change is the material increase in the number of listed occupational diseases. Whereas previously only eleven diseases came under the protection of insurance legislation, there are now twenty-two such diseases. In addition to the previous list of diseases, the following have been recognized: cutaneous disorders resulting from galvanizing operations and from contact with foreign woods, and disorders of the muscles, bones, and joints arising from work with tools operated by compressed

air. Of further importance is the fact that deafness and hardness of hearing bordering on deafness, caused by excessive noise in the metal working and metal manufacturing industries, are likewise recognized as occupational disorders. In addition, grave pneumonokoniosis developing in the sandstone quarries and in the cutting of sandstone, in metal grinding establishments, in the porcelain industry, and in the mining industries is regarded as an occupational disease. That is likewise the case when pulmonary tuberculosis coincides with pneumonokoniosis or is the result of that condition. The insurance is not, as it was formerly, confined to industrial accident insurance but includes also agricultural and marine insurance. For example, the list of compensable diseases enumerates also the typical disorders of sailors (tropical diseases, typhus, scurvy) as occupational diseases. Infections occurring among the personnel of hospitals, sanatoriums, and similar establishments are likewise recognized as occupational diseases. The insurance is not confined to industrial establishments but extends also to activities that are covered by accident insurance in general. A further modification of accident insurance provides that a sharp distinction shall be made between industrial accidents that occur by reason of sudden and unforeseen events, and occupational diseases that are caused by long or repeated actions. Section 547 of the federal act pertaining to the regulation of occupational insurance decrees: "Accident insurance shall apply to occupational diseases irrespective of whether the disease is caused by an accident or by an injurious action that cannot be classified as an accident." The regulations concerning notification by physicians have been revamped and made more stringent. (All physicians are compelled to report every case of occupational disease, even though only a suspicion exists, to the insurance bureau having jurisdiction.) Section 5 of the regulations contains provisions concerning a so-called transitional benefit: "If the fear is justified that an occupational disease will develop, reappear or become exacerbated provided the insured continues to be employed in an establishment that is subject to insurance against the disease in question, the insurance carrier shall be entitled to grant the insured a transitional benefit, which shall not exceed half of the full benefit, so long as he refrains from working in the menacing industry." The second paragraph of this section is likewise important, which provides that, in certain cases, the disability benefit shall be paid in addition to the transitional benefit.—K. R. D.

SOME MEDICOLEGAL ASPECTS OF OCCUPATIONAL DISEASE. *H. H. Kessler. Arch. Int. Med., June, 1929, vol. 43, pp. 874–877.*

This is a brief statement of the recent experience in New Jersey with entirely novel industrial diseases—poisoning by tetraethyl lead and radium—ending with a plea that standards of diagnosis for industrial poisoning be developed with the utmost attention to the physiologic action of the poisons involved.—C. K. D.

CAUSAL RELATION BETWEEN TRAUMA AND TUBERCULOSIS. *G. Magnus. Abstr. as follows from Mün-*

chen. med. Wchnschr., May 10, 1929, vol. 76, pp. 788–790, in Jour. Am. Med. Assn., Aug. 10, 1929, vol. 93, p. 500.

Magnus discusses the question whether tuberculosis may be caused by a trauma, from the point of view of compensation and accident insurance. He cites cases of surgical tuberculosis in which trauma actually causes the tuberculosis, and in which, consequently, the patients are entitled to compensation. He also states that tuberculosis in a latent or in a mild form may grow worse after a trauma. Formerly, it was nearly generally accepted that minor injuries often lead to tuberculosis. However, this theory now has been abandoned, because experiments and observations have proved that it has no valid foundation.—K. R. D.

CAPACITY OF LUPUS PATIENTS FOR WORK. *Helm. Abstr. from Deutsch. med. Wchnschr., Feb. 3, 1928, vol. 54, p. 194, in Am. Rev. Tuberc., Sept., 1929, vol. 20, p. 51.*

The capacity of patients with lupus for work depends upon several factors. It is especially important to consider the partial disability. The question must be looked at from the view of workmen's compensation. One is to be considered disabled: (1) whenever the disease is widespread over the body or is present in many patches and has a tendency to progress, or when the general constitution of the body is considerably impaired; (2) when there is disease of the hand in those doing manual labor, or (3) disease of the lower extremities in persons whose occupation requires free movement of those parts; (4) when, on the face, the disease becomes disfiguring or repulsive; (5) when the disease of the lips, mouth, or mucous membrane of the throat is sufficient to seriously impair nutrition of the body; (6) if the disease encroaches upon the eye so as to impair vision; and (7) where there is a tuberculous complication (lungs, lymph nodes, and bones). These conditions, if of severe grade, create not only temporary but permanent disability.

EYE INJURIES AND ACCIDENT INSURANCE. *A. Vogt. Abstr. as follows from Schweiz. med. Wchnschr., March 9, 1929, vol. 59, pp. 277–281, in Bull. Hyg., July, 1929, vol. 4, p. 622.*

In Germany the loss of an eye from an accident at work is compensated at the rate of 25 to $33\frac{1}{3}$ per cent. of the previous wages. In this article the view is taken that this assessment is too low. While the loss of the power of judging distance with one eye may seriously affect some occupations such as scaffold men, motor drivers, etc., there are some occupations in which the handicap is slightly felt. By practice the power of judging distance with one eye can be much improved. The position of the one-eyed person is largely affected by the state of the labor market, his age and intelligence. Many persons after the loss of an eye suffer from depression and live in constant anxiety that they will lose the sight of their good eye. They find difficulty in obtaining employment for work they could perform quite well, as employers give preference to persons with two eyes. Some authorities therefore consider compensation should be at the rate of 50 per cent. of the previous wages which would do away with hardships and lawsuits,

although in some cases it might be on the liberal side. In fixing a low assessment in a young person it is impossible to foresee what morbid conditions may arise with age or from sympathetic ophthalmia. A young woman's prospect of marriage may be marred. The development of motors during recent years is also a reason for the increase of the assessment which should be on a uniform 50 per cent. basis without the variations which at present occur from 25 to 33⅓ per cent. according to cases. —A. J. C.

THE REACTIONS OF THE TRACHOMATOUS EYE TO INDUSTRIAL ACCIDENTS IN DIFFERENT OCCUPATIONS. *J. Sédan. Abstr. as follows from Rev. Internat. du Trachôme, Jan., 1929, vol. 6, p. 7, in Am. Jour. Ophth., Jan., 1930, vol. 13, p. 96.*

Sédan deplores the absolute lack of agreement between legal decisions and the testimony of medical experts in compensation awards for industrial accidents in cases of trachoma. There is no legal ruling permitting a distinction in a judicial way between the lesions of trachoma that might be considered as due to accident, directly or indirectly, and those lesions which are the complications of trachoma itself.

The author cites a number of ocular accidents seen by him over a period of eight years, referring especially to workers with the emery wheel, occupations in soap factories, and workers who scrape the hulls of ships in dry dock. In the first class there were fifty-two accidents to trachomatous eyes, from which there resulted but four cases of mild keratitis, and one case of aggravation of perfectly cicatrized trachoma. Evidently foreign bodies of rust and emery do not involve serious consequences in old trachoma.

Of twenty-two cases in which trachomatous eyes were burned by soapsuds and caustics, not one suffered reactivation or aggravation of the trachoma, in fact the action of the chemical was beneficial.

The case of the workers in shipyards is somewhat different. Among these men, who are mostly foreigners, trachoma flourishes, and cases of foreign body in the cornea are particularly frequent, owing to the nature of the work. These foreign bodies are cold and quite infectious. In forty-seven accidents of this type, there were nineteen cases of severe recurrence of the trachoma; and, of these nineteen, fourteen received wages for sixty or eighty days of their incapacitation, and eight finally received awards based on 10 to 20 per cent. permanent partial disability. One case of old trachoma was awarded 20 per cent. "for a chronic affection contracted before his industrial accident."

While the problem is not simple, it revolves entirely about the question of the antecedent state of the eye. It is wrong that the state should be called upon to compensate foreigners who exploit their "providential malady." All these cases should be submitted to the International Bureau of Labor of the League of Nations.

BIOMICROSCOPY IN INDUSTRIAL OPHTHALMOLOGY, MEDICOLEGAL ASPECTS. *G. H. Shuman. Abstr. as follows from Pennsylvania Med. Jour., May, 1929, vol. 32, p. 555, in Am. Jour. Ophth., Nov., 1929, vol. 12, p. 946.*

Shuman points out that the advent

of compensation laws has brought into the doctor and patient relationship a third party whose point of view is purely medicolegal. The ophthalmologist may be called upon for information which ordinarily is not necessary for the clinical management of the case. The author stresses the advantageousness of the biomicroscope in deciding between injury and disease, and whether an alleged injury is consistent with the findings. The method of sclerotic scatter is urged, inasmuch as it has been estimated that 80 per cent. of eye injuries resulting in defects of vision involve the cornea. Shuman discusses the differential findings in old or new lesions, cataracts, contusions, siderosis, chalcosis, and detection of early disease (usually of the same nature) in the other eye. The relation of malpractice to the biomicroscope is touched upon in discussion. (References and abstract of discussion.)

COMPULSORY INSURANCE AGAINST OCCUPATIONAL DISEASES. *Foreign Letter (Italy), Jour. Am. Med. Assn., Sept. 7, 1929, vol. 93, p. 783.*

By a recent legislative act, compulsory insurance of workmen, which was already in force with reference to pulmonary tuberculosis, has been extended to occupational diseases. The following diseases have been recognized thus far: intoxications from lead, mercury, phosphorus, carbon disulphide, benzene and homologous products, including ankylostomiasis contracted while working in mines, tunnels, and around brickkilns. For each disease a maximal period that may elapse between cessation from the type of work involved and the onset of the occupational disease in question is established. In case of permanent disability amounting to at least 20 per cent., the workman will receive a pension. The employer is required to provide for the insurance of his workmen and to report promptly to the insurance bureau any case of occupational disease that they contract.—K. R. D.

REHABILITATION OF DISABLED EMPLOYEES

EMPLOYMENT OF THE TUBERCULOUS. *A. C. Klein and G. Thorburn. New York Tuberculosis and Health Association.*

Abstracted as follows in Am. Jour. Pub. Health, March, 1929, vol. 19, p. 345.

A three-year experiment in "medically supervised employment for patients recovering from tuberculosis," conducted by the New York Tuberculosis and Health Association, is summarized in a book published by the Association. The study concludes that "there are no industries in which *all* jobs are suitable for the tuberculous, and on the other hand there are only a few industries which have *no* jobs suitable for the tuberculous."

Another conclusion derived from the experience with more than 900 former tuberculosis patients is that it is not feasible to list trades and jobs which are suitable for the tuberculous, but rather to list the factors to be avoided, and those to be sought, in selecting work for such persons.

The book contains a detailed report of this, the only such experiment thus

far conducted under the intense, active and natural conditions of work in offices, stores, and factories in New York City. The expenses of the experiment were borne jointly by the New York Tuberculosis and Health Association and the Laura Spelman Rockefeller Memorial.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

THE MORTALITY TREND IN THE INDUSTRIAL POPULATION. *L. I. Dublin. Am. Jour. Pub. Health, May, 1929, vol. 19, pp. 475–481.*

This summary of the mortality experience among $3\frac{1}{4}$ million white male wage earners insured in the Industrial Department of the Metropolitan Life Insurance Company shows that between 1912 and 1923 the death rate for this group has declined 27 per cent. A substantial decline has characterized every age group but the greatest reduction has taken place in the important working ages 25 to 34 and 35 to 44, for which the rates declined 43.1 and 41.2 per cent., respectively.

Nearly every cause of death has shared in this downward trend. Analyses were made to determine the trend in specific occupations and the findings for tuberculosis are given here. Of seventy-two occupational classes investigated, all but six showed a lower percentage of deaths from tuberculosis in the period 1922 to 1924 than in 1911 to 1913. The occupations with the highest proportion of deaths from this cause were, in order: miners, underground—other than coal miners; pottery workers; stone cutters; waiters and hotel servants; cutlers and grinders; cigar makers and tobacco workers; laundry workers; compositors, printers, and pressmen; brass foundry workers; barbers and hairdressers; glass workers; and the clerical workers. There has been a decline in the percentage of deaths from tuberculosis in each of these occupations, except the miners (other than coal miners), since 1911 to 1913. Metal miners have shown, in more recent years, a higher ratio of deaths from tuberculosis than they did a decade or more ago. The apparent higher proportion of deaths from tuberculosis among miners may well be the result of greater reductions for the other major causes of death.

The death rate at every age has declined more rapidly for the industrial group than for others. Factors contributing to this improvement in the health and longevity of industrial workers include wide expansion of workmen's compensation, preventive industrial medicine, the safety movement, the reduction in hours of labor, elimination of the sweatshop, better plant sanitation, the wider education of the workers regarding the dangers inherent in certain occupations, and the more intelligent care now taken to safeguard the health of workers. An even more important part has been played by the improved standard of living which has been made possible by the increased prosperity of the wage earner. "It is not unreasonable to expect, therefore, that in the not far distant future the mortality rates of industrial workers will approach, if they do not quite equal, those of the more favored classes of the population."

THE OUTLOOK FOR MORTALITY STATISTICS BY OCCUPATION. *L. E. Truesdell. Am. Jour. Pub. Health, June, 1929, vol. 19, pp. 620–626.*

The author, who is Chief Statistician for Population, United States Bureau of the Census, considers the kinds of material needed for the computation of death rates for occupational groups and the principal difficulties in compiling occupational mortality statistics. He then outlines the proposed program of the Bureau of the Census for the immediate future.

SICKNESS AMONG INDUSTRIAL EMPLOYEES DURING THE FIRST THREE MONTHS OF 1929. *D. K. Brundage. U. S. Pub. Health Rep., Sept. 13, 1929, vol. 44, pp. 2204–2207.*

Figures are given for the frequency of disabilities lasting eight consecutive days or longer in the first quarter of 1929, as compared with the first quarter of 1928, among the male employees of thirteen industrial establishments which reported their cases to the United States Public Health Service.

The first quarter of 1929 showed an increase of 38 per cent. in the incidence rate of disabilities lasting more than one week, as compared with the same period in 1928. For the respiratory disease group an 86 per cent. increase in frequency is indicated; for all forms of pneumonia an increase of 28 per cent. Deaths in the industrial population of the United States and Canada followed the increased frequency of sickness. The Metropolitan Life Insurance Company reported an increase of 18 per cent. in the industrial death rate in the first quarter as compared with the same part of 1928. The mortality rate appears to have been higher than during the first three months of any year since 1920. The combined influenza-pneumonia death rate showed an increase of 88 per cent. over the rate in the first quarter of 1928. Disabilities which lasted more than one week on account of influenza and pneumonia in this sample of the industrial population increased 147 per cent.

Sickness from nonrespiratory diseases as a whole occurred at much the same frequency in the two periods.

STATISTICS OF INDUSTRIAL DISEASES. *W. Weisbach. Abstr. as follows from Zentralbl. f. Gewerbehyg., Oct., 1928, N. S. vol. 5, pp. 308–312, in Bull. Hyg., Aug., 1929, vol. 4, p. 630.*

This is a plea for the keeping of more reliable statistics of the incidence of industrial diseases by bringing them into relation with the number of persons employed in the particular processes and with the output. Seeing that lead poisoning is the dominant form of industrial poisoning, the author takes most of his instances of the unreliability of published statistics from this source, and especially from those relating to the painting industry. He points out very truly that the more carefully the different processes are separated the one from the other and the incidence determined in each, the easier it becomes to discover the danger point and so to suggest a remedy. —T. M. L.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

EXTENSION OF INDUSTRIAL HYGIENE BY TUBERCULOSIS ASSOCIATIONS IN THE UNITED STATES. *B. S. Coleman. Am. Jour. Pub. Health, Feb., 1929, vol. 19, pp. 157–165.*

The author summarizes in a general way the extent to which industrial hygiene activities are being included in the programs of tuberculosis associations. "Considering the interest and work undertaken during the past few years it is reasonable to assume that definite progress, although slow, is being made in the extension of industrial hygiene by tuberculosis associations in the United States."

Many of the tuberculosis organizations studied in the survey are making an attempt to interest industrial executives in the advantages that may be

derived from industrial medical service in the plant, and up to the present time there have been many instances of success as a result of these endeavors.

OCCUPATIONAL DISEASES: DEFINITION, CAUSE, PREVALENCE, AND PREVENTION. *E. R. Hayhurst. U. S. Month. Labor Rev., July, 1929, vol. 29, pp. 29–51.*

This concise statement of the status of industrial hygiene, occupational diseases, and compensation in various states and territories of the United States and in the Canadian provinces is impossible to abstract.—P. D.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

HEMOCHROMATOSIS IN A METAL WORKER. CASE REPORT WITH A BRIEF REVIEW OF THE LITERATURE. *F. C. Wood and T. Fitz-Hugh, Jr. Arch. Int. Med., Dec., 1929, vol. 44, pp. 882–892.*

A typical case of advanced hemochromatosis occurring in a metal worker is reported with detailed clinical, laboratory, and autopsy observations. The literature is briefly reviewed, and the possible etiologic rôle of chronic copper poisoning is discussed. We feel that chronic copper poisoning has not yet been proved to be the cause of this disease.—*Author's Summary.*

OCCUPATIONAL INJURIES OF UROPOIETIC APPARATUS. *E. Dózsa. Monatschr. ungar. Med., 1928, vol. 2, p. 300.*

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

INFLAMMABILITY OF MIXED GASES. *G. W. Jones. Abstr. as follows from U. S. Bur. Mines, Tech. Paper 450, 1929, pp. 38, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4344.*

Results are given of experiments on mixtures of hydrogen, methane, and carbon monoxide with hydrogen and carbon dioxide in varying proportions. Data were obtained on the extinctive action of nitrogen and carbon dioxide on each of the three others from which curves were drawn and tables compiled whereby the inflammable limits of mixtures of each of the combustible with the inert gases can be obtained. By use of these data and the application of Le Chatelier's law it is possible to calculate the limits of inflammability in any mixture of these gases. From the data one may also ascertain the oxygen content below which the atmosphere must be maintained to render it noninflammable. This is of special importance in safety work.—P. D.

INFLAMMABILITY OF MIXTURES OF ETHYL ALCOHOL, BENZENE, FURFURAL, AND ACETONE. *G. W. Jones and J. R. Klick. Indust. and Engin. Chem., 1929, vol. 21, pp. 791–793.*

The following lower inflammable limits were determined for solvents mixed with air at 125°: ethyl alcohol (boiling point 76 to 80°, density 0.817, 5 per cent. water) 3.85 per cent.; benzene (boiling point 78 to 82°, density 0.882) 1.53 per cent.; furfural (boiling point 161°, density 1.159) 2.1 per cent.; acetone (C. P., boiling point 55 to 57°) 2.92 per cent.; acetone (commercial) 3.18 per cent. Mixtures of ethyl alcohol with benzene, furfural, and acetone were determined; in all cases agreement within 0.24 per cent. was obtained with values calculated from Le Chatelier's law.

SPRAY-PAINTING PRACTICES AND HAZARDS. *U. S. Month. Labor Rev., May, 1929, vol. 28, pp. 915–944.*

There is little of hygienic importance in this report not already covered in previous studies.[1] It contains, however, an interesting discussion of the economic aspect of spray painting and lacquering.—P. D.

ACUTE YELLOW ATROPHY OF LIVER CAUSED BY ACETYLENE TETRACHLORIDE. *W. Schibler. Abstr. as follows from Schweiz. med. Wchnschr., Oct. 26, 1929, vol. 59, p. 1079, in Jour. Am. Med. Assn., Jan. 4, 1930, vol. 94, p. 66.*

Schibler reports cases of occupational intoxication that occurred in a shoe factory. The glue that was used contained acetylene tetrachloride. Although three cases had a fatal outcome, several other workers in the same factory developed jaundice and other disturbances, but most of them recovered. The author gives a detailed description of two of the cases in which death occurred as the result of acute yellow atrophy of the liver. The patients were young women, aged 16 and 17, respectively. Two stages were observed in the course of the disease. The prodromal stage lasted, in the first case, about six weeks; in the second instance, only one week. It was characterized by disturbances in the general condition, in the gastric and intestinal functions, with vomiting, fever, and beginning icterus. During the second stage nervous symptoms became manifest, such as motor restlessness, screaming, delirium, and slight convulsive movements of the arms. A slightly soporose condition gradually developed into a deep coma. The author noted in both cases a peculiar oral fetor. A severe icterus developed during the prodromal stage. A hemorrhagic diathesis in the form of epistaxis and bleeding from the mucous membrane of the lips was also noted. Babinski's reflex was present. The heart action was accelerated but the breathing was slow. The characteristic changes in the liver were proved by the diminution of the hepatic dulness and by the tympanic sound in the epigastric region. Laboratory investigations showed that the urine contained albumin, coarse granular cylinders, and bile pigments. The blood was thick and showed a brownish yellow discoloration. The hemoglobin content and the number of erythrocytes and leukocytes were increased. The lymphocytes and neu-

[1] Spray Painting in Pennsylvania. Pennsylvania Dept. Labor and Industry, Special Bull. No. 16, 1926; and Final Report of the Committee on Spray Coating. Nat. Safety Council, Sept., 1927. See also THIS JOUR., 1928, vol. 10, p. 163.

trophils showed a high degree of vacuolation. The sedimentation rate was greatly retarded.—K. R. D.

TOXICOLOGICAL STUDIES OF ACUTE ANILINE POISONING. I. EXPERIMENTAL STUDIES OF ACUTE ANILINE POISONING. *A. G. Young, C. W. Muehlberger, and W. J. Meek. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1926, vol. 27, p. 101, in Physiol. Abstr., Jan., 1930, vol. 14, p. 592.*

Aniline causes a fall in the arterial pressure in dogs followed by a cessation of respiration. The fall in blood pressure is due to a stimulation of the vagal mechanism and to a direct action of the musculature of the heart; there is also some evidence of peripheral vasodilatation. Electrocardiograph tracings show that it depresses the sino-auricular node and the conducting tissues of the heart; all degrees of heart block may be produced. Methemoglobin is not produced in the blood of animals poisoned with aniline, although the blood is brown in color.—C. K. D.

TOXICOLOGICAL STUDIES OF ANILINE AND ANILINE COMPOUNDS. II. HAEMATOLOGICAL STUDIES OF ANILINE POISONING. *A. G. Young. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1926, vol. 27, p. 125, in Physiol. Abstr., Jan., 1930, vol. 14, pp. 592–593.*

Acute aniline poisoning is accompanied by an increase in the number of red cells in the blood; chronic poisoning by a diminution. The brown color of the blood is due to the presence of paraminophenol, and not of methemoglobin. This pigment also appears in the urine.—C. K. D.

DUST HAZARDS AND THEIR EFFECTS

ASBESTOS DUST AND THE CURIOUS BODIES FOUND IN PULMONARY ASBESTOSIS. *W. E. Cooke. Brit. Med. Jour., Sept. 28, 1929, vol. 2, pp. 578–580.*

A useful account is given of asbestos and its dust, chrysotile being chosen as the variety. It belongs to the pyroxene or hornblende group of minerals and its earthy silicates are in the form of fibers. The fibers consist of colorless refractile strands in which are mingled black, brown, golden, and blue particles; asbestos dust is similar, but contains more iron in the particles than does chrysotile. The black particles are biotite and magnetite. Lungs containing asbestos dust show the colored particles, but practically no refractile spicules. Instead, asbestos bodies are found from 20 to 100 microns in length; they are curious in shape with clubbed ends or like elongated dumb-bells. These bodies are distinctive of pulmonary asbestosis and seem to consist of central nuclei of asbestos spicules upon which colloidal aggregates of blood proteins have been adsorbed. The deposit can be dissolved by strong acids leaving the clear spicules behind. There is no reason why any fine spicule of mineral should not have colloidal matter deposited around it; but asbestos is

unique among minerals in being fibrous and the shape of its dust is also unique. Hence these curious bodies are only known to occur in cases of asbestosis.—E. L. C.

CLINICAL ASPECTS OF PULMONARY ASBESTOSIS. *A. C. Haddow. Brit. Med. Jour., Sept. 28, 1929, vol. 2, pp. 580–581.*

An interesting description is given of the clinical course of asbestosis, based on four fatalities. The average time of exposure to asbestos dust was under twenty years, and the average age at death 41. Symptoms develop slowly after five years' exposure, with shortness of breath, dry cough, and then anorexia. Variable pleuritic pains occur, but no night sweats nor hemoptysis. Pulmonary fibrosis occurs with a peripheral and mainly basal distribution with compensatory emphysema in upper lobes. Tuberculosis is not a usual complication; but the condition progresses with weakness and emaciation, and hopeless, sleepless exhaustion, until bronchopneumonia brings death at last. Radiography aids diagnosis, as does also the finding of asbestos bodies in the sputum or by lung puncture. —E. L. C.

A METHOD OF EXAMINING THE SPUTUM FOR ASBESTOSIS BODIES. *M. J. Stewart. Brit. Med. Jour., Sept. 28, 1929, vol. 2, p. 581.*

Half an ounce of sputum is dissolved in an equal amount of undiluted antiformin and centrifuged; the deposit is washed and examined microscopically, after staining for the Prussian blue reaction if desired. Only one or two asbestos bodies are to be expected in a whole film.—E. L. C.

THE TECHNIC OF MEASURING COAL DUST. *C. Förderreuther. Abstr. as follows from Rauch Staub, 1929, vol. 19, pp. 1–12; Wasser u. Abwasser, vol. 26, p. 29, in Chem. Abstr., Oct. 10, 1929, vol. 23, p. 4821.*

The methods of determining dust content, humidity, and inflammability of coal mine galleries are discussed.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

TRAUMATIC CEREBROSPINAL MENINGITIS. *Hügelmann. Abstr. as follows from München. med. Wchnschr., March 29, 1929, vol. 76, p. 541, in Jour. Am. Med. Assn., June 8, 1929, vol. 92, p. 1988.*

A case of cerebrospinal meningitis is reported by Hügelmann. A youth, aged 18, was injured on the left nostril. After the small wound had been dressed, the patient did not complain of pain, and he was able to resume his work as an agricultural laborer. For about a week nothing unusual was noted. Then he suddenly had convulsions and a profuse hemorrhage and collapsed. He was brought to the hospital unconscious. In connection with the previous injury of the nose, the possibility of a lesion of the brain was considered, and the case was diagnosed cerebrospinal meningitis. Death followed a few hours later. The postmortem examination verified

the diagnosis. The case was remarkable, because the infection occurred a week after the trauma. The author reasons that the infection was probably not primary, since in that case the symptoms would have developed earlier. He assumed that the cerebrospinal meningitis was due to an infection from the nose. He concludes that in apparently harmless injuries, the possibility of serious complications should not be overlooked.—K. R. D.

INDUSTRIAL FACTORS IN THE PRODUCTION OF TUBERCULOSIS. *T. Oliver. Brit. Med. Jour., Oct. 12, 1929, vol. 2, p. 674.*

Occupation, although not directly causing, may favor the development of tuberculosis either by reducing the general resistance or by predisposing the pulmonary soil through inhaled dust or external trauma. Fatigue, exposure, and malnutrition acting on less robust adolescents account for a high mortality among tailors and others. More closely studied has been the influence exerted by inorganic dust, particularly by silica particles. Abolition of this hazard from the grinding trade of Sheffield has synchronized with the greatest reduction in any city of the tuberculosis mortality, so that in 1927 this city actually stood lower than any other. Humidity for allaying dust is more dangerous than effective, as has been shown in South Africa; the droplets aid infection, while the finest dust cannot be moistened but remains in the air to be inhaled. Recognition of the infectious nature of tuberculosis must ever aid in suppression of the risk.—E. L. C.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

INDUSTRIAL DERMATOSES: THEIR CAUSATION, RECOGNITION, PREVENTION AND TREATMENT. *S. Overton. Abstr. as follows from Brit. Jour. Dermat., July, 1929, vol. 41, p. 255, in Arch. Dermat. and Syph., Jan., 1930, vol. 21, pp. 114–115.*

Overton, in discussing industrial dermatoses, comments on the fact that returns from the Workmen's Compensation Act for 1927 show that for factories more certificates of disablement were issued for conditions of the skin than for any other compensable condition. He stresses the fact that there has been an increasing number of claims on account of dermatitis contracted by the worker in the course of his employment. Industrial dermatitis may be produced by a vast and ever-increasing array of irritants of animal, vegetable, or mineral origin. For the last three years, alkalies have held first place in the reports of the chief inspector of factories. Degreasing agents, such as turpentine and substitutes, paraffin, petrol and naphtha, sugar, dyes, particularly sulphur and basic, and "accelerators" that were used to shorten time in vulcanizing rubber were found to be among the important causes of industrial dermatitis. Engineers, bakers and flour confectionery workers, platers, dyers and calico printers, in the order named, constituted the groups in which the heaviest toll was levied. As a result of practical experience, the author has found the following suggestions to be of value in the prevention of industrial

dermatoses: (1) the use of emollients before and after work; (2) complete removal of the irritants encountered at work, by harmless methods, several times per shift; (3) inspection of hands and arms by experienced observers to enforce (*a*) early treatment of minor injuries, cuts, and burns, (*b*) scrupulous cleanliness of hands, arms, and overalls, (*c*) removal from irritants and prompt treatment in early cases.

The importance of recognizing that a dermatosis is of industrial origin is discussed by Overton, and the fact that certain irritants produce localized lesions, besides causing a dermatitis, such as chrome and alkalies, is mentioned. The site of the dermatitis and knowledge of the irritants encountered in apparently innocuous occupations are among the subjects also briefly discussed.

INDUSTRIAL DERMATOSES: THEIR CAUSATION, RECOGNITION, PREVENTION AND TREATMENT. *W. Dyson. Abstr. as follows from Brit. Jour. Dermat., July, 1929, vol. 41, p. 264, in Arch. Dermat. and Syph., Jan., 1930, vol. 21, p. 115.*

Dyson discusses those cases which are indistinguishable from cases of dermatitis commonly described as eczema. Such cases are commonly seen in bleachers, dye workers, chemical workers, plasterers, rubber workers, French polishers, and hairdressers. He recognizes no difference between an eczematous occupational dermatitis and eczema. Any condition which predisposes to eczema will also predispose to occupational dermatitis. Hyperhidrosis is a common factor in its production and xerodermatous and ichthyotic subjects are more susceptible than others. Idiosyncrasy is mentioned; and the author discusses the subject of sensitization and states that prolonged or repeated attacks of dermatitis may produce a general sensitization which has many of the characters of an "anaphylactic state." Seborrhea and secondary pyogenic infection, in his experience, favor the development of a general sensitization, although it may develop without the presence of any of these factors.

Reference is made to McGlasson's work on blood sugar content in dermatitis. Dyson examined fifty patients with all types of eczema and eczematous occupational dermatitis with this point in mind, and found that when pruritus was intense and there was no discharge, the average blood sugar content was high, but when the inflamed surface was discharging, the average blood sugar content was less. It was suggested that these results might be due to the liberation of histamine from the epithelium, which causes a liberation of glycogen from the liver by stimulating the secretion of epinephrine, and experiments are cited in which injections of histamine were given to raise the blood sugar content, with negative results. Experiments were also conducted by giving small repeated doses of the toxin producing the anaphylactic state, if sensitization is such a state, to determine whether an antianaphylactic state could be established and the patient could be gradually desensitized. One c.c. of either blood serum or whole blood was injected at weekly intervals in seventeen cases. In ten of the cases, the patients made steady progress toward recovery; in most cases, the itching ceased after one or two

injections. Only one of these patients has had a relapse to date. In one case the condition had cleared up after the patient had received eleven injections. A relapse within seven weeks followed, however, and the patient showed no improvement on subsequent injections. Four other patients showed no response to treatment, and in two cases the injections were discontinued.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

ACCIDENTS OF OLDER WORKERS: RELATION OF AGE TO EXTENT OF DISABILITY. *A. F. Stevens, Jr. Personnel Jour., Aug., 1929, vol. 8, pp. 138–145.*

"Relationship of age of injured workman to the extent or duration of disability is tested for correlation. In general, the relationship is definite and positive for all injuries except for the one class 'Burns and Scalds.' This is a development quite unlooked for and presents a problem outside the scope of this treatment.

"A special dispersion study is made of 1711 cases of 'Cuts, Punctures, and Lacerations.' In order to give each age-group proper weight, each variable is reduced to a relative of its group total. Curves are plotted which show that the mature workman is disabled for a longer period than the younger man and that frequency increases with age."

ACCIDENT PRONENESS: RESULTS OF A STUDY OF ACCIDENT PRONENESS AMONG EMPLOYEES OF THE CLEVELAND RAILWAY COMPANY. *Elec. Traction, May, 1929, vol. 25, pp. 229–231.*

ELECTRICAL ACCIDENT PREVENTION. *L. C. Ilsley. Abstr. as follows from U. S. Bur. Mines, Information Circ. No. 6100, Feb., 1928, pp. 8, in Am. Jour. Pub. Health, July, 1929, vol. 19, p. 826.*

This circular discusses the prevention of electric shock; the safeguarding of machinery and apparatus, both upon the surface and underground; the prevention of gas ignition and explosions; the suggestions for improvement; and mine fire prevention.

STATUS OF INDUSTRIAL SAFETY REGULATIONS. *U. S. Month. Labor Rev., March, 1929, vol. 28, pp. 521–533.*

Lists are given which include: (1) codes approved by the American Standards Association as of Jan. 1, 1928; (2) codes in process of development; and (3) subjects which are not included in (1) and (2) but on which certain states have safety rules or regulations. This information is classified by subject and by state.

INDUSTRIAL SURGERY

ANALYSIS OF FRACTURES AT LYNCH, KENTUCKY, MINES DURING PAST FIVE YEARS. *M. H. Todd. Kentucky Med. Jour., Jan., 1929, vol. 27, p. 13.*

CRUSH-BURNS OF HAND. *F. Maclure. Jour. College of Surgeons of Australasia, Nov., 1928, vol. 1, p. 233.*

J. I. H.
Feb., 1930

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

HUMAN SKIN TEMPERATURE AS AFFECTED BY MUSCULAR ACTIVITY, EXPOSURE TO COLD, AND WIND MOVEMENT. *F. G. Benedict and H. S. Parmenter. Am. Jour. Physiol., Jan., 1929, vol. 87, pp. 633–653.*

Exposure to cold, even when the exposure was accompanied by strenuous exercise, resulted in a general lowering of surface temperature, particularly the temperature of the extremities. The peripheral temperature was likewise lowered during short periods of indoor exercise, such as walking on a treadmill or stair climbing, despite the fact that the metabolism had increased 500 or 600 per cent.

These alterations in the surface temperature are tentatively attributed to vasomotor adjustments which decrease the flow of blood to the surface by constricting the peripheral vessels in order to divert the blood to the active muscles.—C. P. Y.

THE ACTION OF GAS MIXTURES CONTAINING CARBON DIOXIDE ON THE RESPIRATION. *A. Viethen and F. Grüneberg. Abstr. as follows from Klin. Wchnschr., 1929, vol. 8, p. 887, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4247.*

Air or oxygen that contains 1 per cent. of carbon dioxide has no effect upon respiration in children past 6 years of age. In younger children the respiratory volume may be increased 33 to 50 per cent. A mixture containing 2 or 3 per cent. of carbon dioxide is effective at all ages. Lung volume is increased 50 to 100 per cent. The respiratory rate is not increased. A mixture containing 4 per cent. of carbon dioxide increases the respiratory volume 100 to 150 per cent. The respiratory rate is also increased.

THE METABOLISM OF MUSCLE. II. THE RESPIRATORY QUOTIENT OF EXERCISING MUSCLE. *H. E. Himwich and M. I. Rose. Abstr. as follows from Am. Jour. Physiol., 1929, vol. 88, pp. 663–679, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4252.*

Respiratory quotients for (1) non-isolated muscles, (2) isolated muscles, and (3) for the animal as a whole were determined on dogs. The respiratory quotient obtained from the blood of exercising muscle usually agrees with that obtained for the resting animal as a whole. There is thus no evidence pointing to exclusive carbohydrate utilization during exercise; rather the working muscles seem to oxidize foodstuffs in the same proportion as the whole organism during rest.

THE EFFECT OF MUSCULAR EXERCISE ON THE OXYGEN CAPACITY OF THE BLOOD IN MAN. *T. R. Harrison, C. S. Robinson, and G. Syllaba. Abstr. as follows from Jour. Physiol., 1929, vol. 67, pp. 62–65, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4249.*

Blood from the hand veins after immersion in water at 45° was the same in oxygen content as arterial blood while the subject breathed air. It had a slightly lower oxygen content than arterial blood when the inspired gas contained 10 to 15 per cent. oxygen. Oxygen capacity of the blood was in-

creased during exercise. The oxygen saturation of the arterial blood sometimes increased and sometimes decreased during exercise, but more often it increased.

CHANGES ACCOMPANYING WORK AND FATIGUE OF MUSCLE. *L. Wacker. Abstr. as follows from Klin. Wchnschr., 1929, vol. 8, p. 244, in Arch. Path., Aug., 1929, vol. 8, pp. 322–323.*

The content of calcium and magnesium is increased considerably in the blood of rabbits fatigued by an alternating electric current during urethane narcosis. The increase of the calcium in the serum averages 50 per cent., and of the magnesium about 140 per cent., that of the resting values in urethane narcosis. The increase in magnesium is relatively greater than that in calcium. The quotient $\frac{Ca}{Mg}$ diminished from $\frac{10.84}{2.93} = 4.16$ in the nonfatigued animal to $\frac{18.03}{7.01} = 2.57$ in the fatigued animal. The increase of calcium and magnesium in the blood with fatigue disappears after several hours of rest. The high calcium and magnesium content of the blood in fatigued animals is derived probably from the muscle, the bases being liberated from the earthy phosphates dissolved by the muscle acidity and then transferred to the blood. With magnesium narcosis the magnesium content of the serum exceeds the calcium and the $\frac{Ca}{Mg}$ quotient $\frac{9.40}{19.41}$ diminishes to 0.48. Part of the calcium is replaced by magnesium. In the normal rabbit serum the calcium is 11.84 mg. per 100 c.c.; in the narcosed animal 9.40 mg. per 100 c.c.—*Author's Summary.*

CARRYING OF LOADS. *O.A. Riwosch. Abstr. as follows from Zentralbl. f. Gewerbehyg., Nov., 1928, N.S. vol. 5, pp. 338–347, in Bull. Hyg., Dec., 1929, vol. 4, p. 975.*

This paper works out mathematically the best conditions for carrying of loads and deals with various factors which have to be considered: *e.g.*, static and dynamic work, fatigue, determination of efficiency on a level stretch of road, the consumption of energy in carrying, laying down, and returning for a fresh load, the influence of speed of movement, the determination of efficiency when an ascent has to be made, whether on a track or up steps, etc.

Curves are used to illustrate the conclusions.—T. M. L.

INDUSTRIAL FATIGUE. *E. L. Fisk. Am. Jour. Pub. Health., Dec., 1928, vol. 18, pp. 1465–1469.*

Dr. Fisk considers that too little attention has been paid to the intrinsic factors contributing to fatigue and he makes a plea for a balanced study of the whole fatigue question in which each line of research shall be properly weighted. He advances his views "in the hope that in all research centers in industrial hygiene where industrial fatigue is given considerable thought, there may be a readjustment of the mental attitude toward this problem and an approach from a wholly different angle than has heretofore been customary in fatigue studies or in efforts toward the mitigation of fatigue." "Error and misunderstanding on this question will be avoided if

the effects of work and environment are measured upon workers graded according to their physical equipment. Then there will be presented a true picture of the man at work."

ON SUPPLANTING THE INDUSTRIAL FATIGUE CONCEPT. *R. M. Page. Abstr. from Jour. Business, April, 1929, vol. 2, pp. 137–150, and Soc. Indust. Eng. Bull., July, 1929, vol. 11, pp. 3–9, in Personnel Jour., Dec., 1929, vol. 8, pp. 289–290.*

In industrial usage, fatigue is often held to be simply that effect of doing work which results in a lowered capacity for the continuation of such work. All physiologic definitions describe certain changes which occur as a result of muscular work, but it is arbitrary to declare that they constitute what we have come to know under the name of fatigue. Human fatigue cannot be handled quantitatively. No fatigue tests so far proposed have been found to give consistent results under all circumstances.

By replacing the fatigue concept with that of energy cost, the author presents a fresh point of view illustrating by graphs the many possible applications of his theory.

A bibliography is included.

PRACTICAL CONSIDERATIONS OF FATIGUE. *W. A. Sawyer. Soc. Indust. Eng. Bull., March, 1929, vol. 11, pp. 11–16, 24.*

Working conditions; lighting; air; posture; noise; supervision.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

ELECTRIC SHOCK. *H. E. MacMahon. Abstr. as follows from Am. Jour. Path., July, 1929, vol. 5, p. 333, in Jour. Am. Med. Assn., Sept. 7, 1929, vol. 93, p. 798.*

The literature dealing with the pathologic changes in the nervous system of electrocuted animals is reviewed by MacMahon, and it is shown that the lesions are confined almost entirely to the nervous system and skeletal muscle.—K. R. D.

TRANSITORY DILATATION OF HEART AND AORTA, AND VESTIBULAR DISTURBANCES CAUSED BY POWERFUL ELECTRIC CURRENT. *O. J. Lasius. Abstr. as follows from Med. Klin., July 19, 1929, vol. 25, p. 1133, in Jour. Am. Med. Assn., Oct. 12, 1929, vol. 93, p. 1182.*

Lasius reports the case of a man, aged 29, who, after coming in contact with a powerful electric current, was unconscious for a time. When he arrived at the hospital, about one hour after the accident, he appeared weak and sleepy. He had chills and tremors and complained of severe pains in the left side, especially in the heart and in the head. The motility of the left arm and foot was also reduced. Marks on the left thumb and on the bottom of the feet indicated that the current had entered the body through the left thumb and had passed out through the feet. Auscultation did not reveal abnormalities in the in-

ternal organs, but because the patient always complained of pains in the heart, roentgenoscopy was performed. It revealed a dilatation of the heart and of the aorta. The author assumes that, when the current passed through the heart, it caused changes in the myocardium, which in turn led to the dilatation. The patient's condition improved gradually. Roentgenoscopy, two weeks later, showed that the enlargement of the heart and of the aorta had decreased considerably. In order to relieve the headaches, a lumbar puncture was performed. After that the pressure and the pain in the head were somewhat reduced. Examination of the ears revealed disturbances in the left inner ear, especially in the vestibule. They were still noticeable six weeks after the accident, when all other symptoms had already disappeared. After reviewing the literature and on the basis of his own observations, the author concludes that electric traumas generally become manifest in functional disturbances. In most instances normal conditions are restored in a comparatively short time. However, in some instances late death may result from an electric trauma. The case reported by the author illustrates the great significance of roentgen examination in these cases.—K. R. D.

RETINAL EDEMA CAUSED BY ELECTRIC SHOCK. *H. Jourdan. Abstr. as follows from Ann. d'ocul., Sept., 1929, vol. 166, pp. 725–727, in Am. Jour. Ophth., Jan., 1930, vol. 13, pp. 81–82.*

A lineman seized a live wire in one hand. He felt a tremendous shock but was not rendered unconscious nor was he burned. He noticed immediately that he was blind in one eye. The following day sight began to return. There was a scotoma in the upper half of the central field and a cap-like paracentral scotoma above this. Red vision appeared normal but blue was mistaken for green and green for yellow. The condition improved and there was a return to normal in three months.

HEAT, COLD, AND HUMIDITY

THE ESTIMATION OF THE HEAT RETAINING PROPERTIES OF CLOTHING MATERIALS. *F. P. Leusden. Abstr. as follows from Ztschr. f. Hyg., 1929, vol. 109, pp. 616–618, in Bull. Hyg., Nov., 1929, vol. 4, p. 954.*

Experiments which have been made with Hill's kata-thermometer and the Davos frigorimeter have shown that when the instruments are covered with thin material there is a more rapid giving off of heat than when the instruments are left uncovered. Thus in an experiment with an uncovered dry kata-thermometer the fall from 38° to 35° took 117 seconds, but when covered with thin tricot it took only 109 seconds. Experiments were made to show the effect of the hygroscopic property of a material. A not specially dried material was used and the same fall of temperature took 126 seconds. The material was then dried with hot air and the fall took 145 seconds, and after further drying 154 seconds. Therefore the drier the material the greater heat retaining properties it has. It is also found that

woven threads are much better conductors of heat than of air.—A. J. C.

REPEATED EXPOSURE TO HIGH TEMPERATURE. EFFECT ON LYMPHOID TISSUE AND ON LEUKOCYTE COUNT. *O. R. Caillet and J. P. Simonds. Arch. Path., Oct., 1929, vol. 8, pp. 622–627.*

Repeatedly heating mice at 60°C. for five minutes at intervals of ten days results in (*a*) a temporary lymphopenia, followed by (*b*) an increasing lymphocytosis up to about the fortieth day or the third or fourth heating. After this time each successive heating becomes less and less effective until, after about 200 days or twelve or thirteen heatings, the total leukocyte count and the percentage of lymphocytes return to or below normal and show little or no effect from further heating.

The diminishing effect of successive heatings on the leukocyte count after about the fortieth day is accompanied by an increasing fibrosis of the spleen and lymph glands.—*Author's Summary.*

WOMEN AND CHILDREN IN INDUSTRY

THE EFFECTS OF LABOR LEGISLATION ON THE EMPLOYMENT OPPORTUNITIES OF WOMEN. *U. S. Dept. Labor, Women's Bur., Bull. No. 65, 1928, pp. 495; (Summary) Women's Bur., Bull. No. 68, pp. 22.*

The findings in this investigation show that fundamental differences exist in the opportunities and extent of employment for women and in the legislation regulating their employment, and that consequently important differences are apparent in the effects of the legislation.

There are two distinct types of legislation applying to women's employment—laws that regulate and laws that prohibit. It is difficult to measure what the prohibitory laws may have done to women's opportunities in the states where they are in effect. From the fact that women are successfully employed elsewhere in many of the prohibited occupations, it appears that the prohibition must be something of a restriction where it exists.

In general, the regulatory hour laws as applied to women engaged in the manufacturing processes of industry do not handicap the women but serve to regulate employment and to establish the accepted standards of modern efficient industrial management. When applied to specific occupations, not entirely akin to the industrial work for which the laws were drawn, this regulatory legislation in a few instances has been a handicap to women.

Laws prohibiting night work for women in industry are chiefly a reflection of the usual attitude of employers regarding such practice, but occasionally they result in a limitation of women's employment. When applied indiscriminately to special occupations that are professional or semiprofessional in type, night work prohibition or regulation has resulted in restrictions of women's employment.

In almost every kind of employment the real forces that influence women's

opportunity are far removed from legislative restriction of their hours or conditions of work.

THE HEALTH OF WOMEN AND GIRLS IN RELATION TO INDUSTRY. *Mrs. R. H. B. Adamson. Abstr. from Jour. State Med., Feb., 1929, vol. 37, pp. 107–113, in Am. Jour. Pub. Health, July, 1929, vol. 19, p. 823.*

Our intelligent girls from the industrial classes when they leave school usually become highly skilled workers, and when they marry they are far better off because they may continue at such work when, owing to industrial depressions, the husband is out of work. Their physical fitness should be vouched for after medical examination. Among practical tests, acuity of vision is specially important. Likewise, mental defects, middle ear disease, dysmenorrhea, and defects following childbirth are prominent and lamentable, the more so because so many may be corrected. The mother of a family who has not been damaged in childbirth is perfectly fit for hard physical work. During the War, the author recalls three cases of direct inguinal hernia, as the result of work on lathes; no woman developed an indirect inguinal or femoral hernia; no woman with an intact pelvic floor developed any uterine displacement; and no woman developed cardiac incompetency where the heart was sound on engagement. Work in no way conduced to sterility, but even appeared to render some more fertile.

The author's practice has failed to find defects in women attributable to hard work, during the War or afterward. The principal point is physical fitness of women for work, and not that women should not work. "There is no inherent incapacity for hard work in women as a sex, and public opinion and legislation" should be changed in this respect.

WOMEN WORKERS IN FLINT, MICH. *U. S. Dept. Labor, Women's Bur., Bull. No. 67, 1929, pp. 79.*

By far the largest group of women who were at work was found in the automobile industry. Conditions of work varied considerably not only in the actual work performed but in the earnings and hours. The median of the week's earnings of all wage earning women included in the survey was $16.50. The median of the week's earnings in the automobile industry was the highest of all, and this industry also had the largest proportion of women with weekly hours of 50 and under. The lowest median was in the 5 and 10 cent stores, and for all workers employed in such stores weekly hours were over 52. The most usual week in the manufacturing industries was 50 hours; in stores, between 50 and 54 hours; and in laundries, between 48 and 50 hours. The women in restaurants had by far the longest week, a fifth of such workers reporting a schedule of over 58 hours. The most usual workday was one of $8\frac{1}{2}$ or 9 hours. A shorter day was worked on Saturday in almost all the factories and laundries, but this was not true of stores, where hours were in many cases as long as on other days and for more than half the women they were longer.

Investigation of working conditions showed that more attention had been

given to lighting than to ventilation. In laundries and restaurants, although general ventilation had been taken care of, the importance of good hoods, with exhausts, over machines and stoves where steam is generated was little realized. Seating facilities were inadequate for women in laundries and in some automobile plants for workers on standing jobs.

In thirty-one of the thirty-four establishments with bubblers, these were of the insanitary type; in twenty-one plants there were common drinking cups. The common towel was found in fifty-six establishments, and there were no towels in twenty-four. Toilet facilities were inadequate in thirteen establishments.

SOME UNSOLVED CHILD LABOR PROBLEMS. *E. M. Johnson. Am. Jour. Pub. Health, Aug., 1929, vol. 19, pp. 893–897.*

There are practically no regulations for children employed in industrialized forms of agriculture; the health of children entering or already in industry is insufficiently safeguarded; and children are still being permitted to work "in connection with" some very dangerous machines. A few states are trying to reduce industrial accidents to children by requiring extra compensation in the case of those injured when illegally employed; the majority, however, have no such provision. The Massachusetts laws regarding each of these unsolved problems are discussed.—M. C. S.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

EFFECT OF ATMOSPHERIC POLLUTION UPON INCIDENCE OF SOLAR ULTRA-VIOLET LIGHT. *J. H. Shrader, M. H. Coblentz, and F. A. Korff. Am. Jour. Pub. Health, July, 1929, vol. 19, pp. 717–724.*

Solar ultraviolet light in Baltimore was measured by the lithopone method and checked by three other photochemical methods. "Dust-cups and konimeter measurements of atmospheric pollution indicated that this was heaviest in the center of the city and fell off to approximately one-sixth as much in the country. Contrariwise, the amount of ultraviolet light in the country was 50 per cent greater than in the city. In parallel with this, it was found that the amount of settled dust on top of a tall city building was materially less than at street level, while the incidence of solar ultraviolet light on the building was greater than at street level. Measurements made on 'clear' days showed somewhat greater incidence of ultra-violet light than on cloudy days. The passage of ultra-violet light through confined air artificially polluted with fuller's earth, street sweepings, and lamp black, respectively, shows that they are increasingly effective in the order mentioned in occluding solar ultraviolet light. Skyshine yields about 70 per cent of the amount of ultraviolet light received by direct sunlight."

In concluding, the authors state: "The constituents of atmospheric pol-

lution in summer are greater in quantity and different from those in winter."

Dust determinations were carried out from March, 1926, to October, 1928; the solar ultraviolet measurements for one year only are presented.

This concise, well-written paper contains an excellent and thoroughly pertinent bibliography.—P. D.

THE INFLUENCE OF ILLUMINATION ON THE WORKING EFFICIENCY OF MAN. *L. Schneider. Abstr. from Illumin. Eng., 1928, vol. 21, pp. 275–279, 307–311, in Bull. Hyg., Oct., 1929, vol. 4, p. 810.*

This paper stresses the difficulties in illumination research which are due to multiple variable factors—such as brightness, glare, shadow, the color of light, the rapid ascent of empirical standards of lighting, and the physiologic and psychologic effects of these factors upon efficiency. It indicates the inapplicability of former, simple, static, visual acuity tests to modern needs under complex dynamic conditions, and (under the imposing title of "Psychotechnics") proposes to study the practical application of illumination to man's physiologic and psychologic needs.

The paper concludes by several interesting illustrations of the practical influence of various illumination factors upon efficiency in human work. —P. S. L.

THE LIGHTING OF FACTORIES FROM AN ECONOMIC STANDPOINT. *F. A. Förster. Abstr. from Zentralbl. f. Gewerbehyg., Oct., 1928, N. S. vol. 5, pp. 291–299, in Bull. Hyg., Oct., 1929, vol. 4, pp. 811–812.*

This well-illustrated article, although more technical, treats the subject in much the same way as does the British Home Office Welfare Pamphlet (No. 7), on "Lighting in Factories and Workshops." It describes the effect on the worker and on the work of good and bad illumination, states the fundamental requisites of good lighting as regards adequacy and suitability, and illustrates good local lighting, localized general lighting and general lighting, and semi-indirect and indirect. —T. M. L.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

TRENDS IN PERSONNEL HEALTH SERVICE. *W. H. Lange. Abstr. as follows from Am. Management Assn., General Management Series, No. 85, 1929, pp. 48, in Am. Jour. Pub. Health, July, 1929, vol. 19, p. 824.*

This bulletin discusses in Part I the agencies interested in the promotion of organized health and sanitation activities, both prior to and since 1910. Part II takes up industrial groups, including the activities of various industrial associations, many leading companies and corporations of the United States, as well as the efforts of organized labor and joint boards of sanitary control. Among associations, societies, and institutions, the names and dates of organization are given for twenty-four. Under public agen-

cies are listed the principal medical schools, federal and state departments, bureaus, and agencies. Legislation has been concerned principally with reporting, prohibition, regulation, and compensation or insurance.

The article ends with a brief summary of the principal literature, and the statement that prior to 1880 the Index Catalogue of the Surgeon General's Library shows that there were but five books and seventy-five articles relating to industrial hygiene or occupational diseases, by American authors. During the period 1880 to 1900, American authors made but twenty-two contributions. From 1900, and more especially from 1908, such contributions increased to the extent that by June 30, 1921, 702 subjects had been indexed in the Library of the Surgeon General's Office.

INDUSTRIAL HEALTH SERVICE. *A. R. Pennoyer. Canadian Med. Assn. Jour., April, 1929, vol. 20, pp. 361–364.*

Dr. Pennoyer outlines the system in practice in the Bell Telephone Company of Canada, the aims of which are:

1. By preemployment examination to select a suitable personnel.

2. To do all that is reasonably possible to prevent illness and maintain health, and when sickness occurs, to make sure that proper treatment is provided, so that restoration may be as early and complete as possible.

3. To use every means to avoid the occurrence of accidents and, when these do arise, to see that they are treated skilfully.

4. To make provision for the disabilities of old age, when this has been arrived at through long service, and to do what is possible for the dependents when death comes.

No medical treatment is undertaken, except the administration of inoculation and vaccination in the presence of epidemics, but all accidents are treated to a conclusion. Supervision of the buildings with a view to insuring hygienic standards is exercised; recreation is encouraged; poster and bulletin service is maintained; supervision of home conditions through trained nurses is carried on; a sickness benefit plan is maintained at the company's expense; and a constant campaign is carried out with a view to preventing accidents.—M. C. S.

MEDICAL AND PUBLIC HEALTH WORK IN A LARGE COAL COMPANY. *D. J. Kindel. Am. Jour. Pub. Health, July, 1929, vol. 19, pp. 725–730.*

This paper reports the work of the medical department of the Consolidation Coal Company, Inc., Fairmount, W. Va., which provides medical and nursing service for 10,000 employees and their families. Its operations extend into four states—Kentucky, West Virginia, Pennsylvania, and Maryland—and there are six divisions, the minimum distance between any two being approximately 60 miles, and the maximum distance 300 or more miles. Since the locations of the employees and communities are so scattered, areas, or medical units, have been established, each in charge of a physician and a public health nurse.

The personnel consists of eighteen full time physicians in charge of thirteen medical units, a chief hospital surgeon, an assistant, a full time laboratory physician, six dentists, a

supervisor of public health nurses, eleven full time public health nurses, and eight hospital nurses.

Employees receive all usual medical attention, including minor surgery. Hospital service is given by private or state institutions, except in one division where the Company operates its own fifty-bed hospital. Employees contribute on a monthly basis, and no charge is made for treatment, drugs, dressing, or other materials, but $20 is allowed the physician in obstetrical cases, and small fees in venereal diseases. The average cost per family for medical attention, excluding hospitals, is approximately $36 a year, for which they actually pay $18.—M. C. S.

THE VALUE OF THE AUDIOMETER IN INDUSTRIAL MEDICINE. *G. E. Tremble. Canadian Med. Assn. Jour., Jan., 1930, vol. 22, pp. 71–75.*

The author describes the audiometer and discusses its use. On the basis of his experience, he comes to the following conclusions:

1. By this method hearing tests can be accurately determined by an office nurse or a trained otologist with a minimum of difference but with equal diagnostic value.

2. The charts visualize to the patient as well as to the physician the actual defects of hearing, and suggest at once the type of disease causing the deafness, whether of the conducting mechanism or of nerve origin.

3. The recorded graphs are easily interpreted and enable a tentative diagnosis to be made before an examination is completed.

4. The advantage of the audiometer over tuning forks is that the results are definite and concise and the audiograms obtained can be transmitted from one physician to another.

5. Graphs taken from time to time demonstrate to the patient and physician improvement in hearing or the contrary, and this cannot be done to the same extent by means of tuning forks.

6. The charts are analogous to fields of vision, and are of like value in picturing the hearing loss in percentage.

7. Malingering can easily be detected.

8. Finally, accurate hearing tests can be made speedily and filed away for permanent records which will prove of great value in medicolegal cases and industrial medicine.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

BOREDOM IN INDUSTRY. *S. Wyatt. Personnel Jour., Oct., 1929, vol. 8, pp. 161–171.*

"This paper summarizes the results of experimental enquiries into the nature and causes of boredom and suggests remedies for it in the case of factory machine operators engaged in repetitive work. . . . . Not all workers are subject to boredom but after two hours at the same task most operators become restless and continue work with effort or reduced efficiency. Boredom is experienced less in the afternoon than in the morning. . . . . The nature of the task contributes to boredom: operations involving attention and adjustment in response to varied situations are in general less boring than those requiring only intermittent or partial attention; while tasks so automatized as to permit uninterrupted mind wandering seem to produce—in workers temperamentally suited to repetitive work—a minimum of boredom,—which suggests a means

for its avoidance. Keeping pace with a rhythmically operating machine; teaching the operator the importance of the work he is doing; supplying material in small lots rather than in an endless flow along a belt; improving working conditions, both for the prevention of unpleasant day-dreams about the job and for the development of pride in the organization and satisfaction in the job are all indicated remedies for the dissipation of boredom. Facilities for developing a richer life outside the factory will be provided by employers interested in the development of the worker as a citizen."

MEASURING SUSCEPTIBILITY TO MONOTONY. *L. A. Thompson, Jr. Personnel Jour., Oct., 1929, vol. 8, pp. 172–196.*

"This study is an experimental approach to the increasingly important question of how to measure or to predict susceptibility to monotony. The first part is a review of the literature with a critical statement of the problem; the second reports an experimental attack on the subject."

Monotony, or uniformity, is not an attribute of any type of work *per se*; it is a conditioned habit system in the individual which to a large degree controls the direction of behavior modification that is possible in that individual.

A novel and seemingly valid method of measuring susceptibility to uniformity of work is suggested. From a set of twelve tests, a battery of four were finally selected which when optimally weighted and combined gave a correlation of 0.71 with the criterion (susceptibility to uniformity). Attention is also directed to the fact that it is possible to use such instruments as emotional and personal history records to approach problems that have not yielded to other technic. The most important single factor in predicting susceptibility to uniformity was emotional instability. Production decrement difference scores were also found about equally effective in predicting the criterion.

"Contrary to all expectations, intelligence was found to play but a minor rôle in determining susceptibility. In general it may be stated that susceptibility to monotony is little influenced by intelligence status."

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

THE POSSIBLE RELATIONSHIP OF MUTUAL BENEFIT ASSOCIATIONS TO THE HEALTH OF EMPLOYES. *H. A. Seymour. Am. Jour. Pub. Health, Jan., 1929, vol. 19, pp. 16–20.*

Seymour notes the features of mutual benefit associations which appear to be disadvantageous, and states the immediate answer to each. He believes that: "In general, every well managed mutual benefit association, by contributing its quota to the health of its community, assists in the general social economic advancement of society. This country's loss of a quarter of a billion dollars annually, due to sickness, is largely a direct loss to productive industry. The more health insurance spreads throughout the nation, the greater our prosperity and the better off we shall all be."

MOBILIZING MUTUAL BENEFIT ASSOCIATIONS FOR HEALTH. *M. W. Alexander. Am. Jour. Pub. Health, Jan., 1929, vol. 19, pp. 21–28 (Discussion pp. 28–30).*

The author believes that a new and useful field of activity is opening for these associations. "Not only can a mutual benefit association be instrumental in promoting and coördinating the social and recreational activities of the employes in an establishment, and in these and similar ways serve as a valuable point of contact between management and the employes collectively, but the benefit association, organized and managed by and possessing the confidence of its members, is ideally equipped to sponsor a movement and carry through an effective program in the interest of the health of its members and their families."

Requirements for effective health work and constructive possibilities of mutual benefit associations are discussed.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

STATE REGULATIONS REGARDING SPRAY PAINTING. *U. S. Month. Labor Rev., May, 1929, vol. 28, pp. 944–957.*

Very complete data are given on the spray painting regulations adopted by various states in the Union.—P. D.

DOCTOR AND WORKMEN'S COMPENSATION LAW. *C. C. Johnson. Nebraska State Med. Jour., Jan., 1929, vol. 14, p. 24.*

ACTINOMYCOSIS IN ACCIDENT INSURANCE: CASE. *Reckzeh. Klin. Wchnschr., Nov. 25, 1928, vol. 7, p. 2299.*

TRAUMATIC NEUROSES AND GERMAN COMPENSATION LAWS. *Quensel. Med. Klin., Feb. 8, 1929, vol. 25, p. 213.*

DEATH IN A "BLEEDER" FROM OCCUPATIONAL STRAIN. *P. Kissinger. Abstr. as follows from Aerztl. Sachverst.-Ztg., 1928, vol. 34, p. 319, in Arch. Path., Sept., 1929, vol. 8, p. 546.*

The symptoms of weakness came on suddenly while the man in question was lifting cement blocks. He was 45 years old, and was known as a "bleeder," having had severe hemorrhages from simple cuts on his fingers, extraction of teeth, etc. He entered the hospital four days after his attack, complaining of weakness and tenderness in the right lower quadrant of the abdomen, where there was a swelling as large as a fist. He knew his condition and diagnosed his trouble. Since the accident he had become anemic; he died eighteen hours after entrance. A huge hemorrhage was found in the right iliac fossa retroperitoneal extending up so as to surround the right kidney. Its source was not found. Others have reported similar accidents in persons with hemophilia: one was a fatal intestinal hemorrhage in a man who had pressed with his abdomen on a lever; a second was a death from renal hemorrhage following a severe strain, and a third was a huge fatal hemorrhage in an obese bank official about the urinary bladder and adjacent structures, brought on by coughing.

ABSTRACT OF THE LITERATURE
OF
INDUSTRIAL HYGIENE

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GENERAL

ANNUAL REPORT OF THE SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH FOR THE YEAR ENDED 31ST DECEMBER, 1928. *Johannesburg, 1929, pp. 87.*

Each year the work of the Institute, originally founded in connection with the gold mining community, is concerned more and more with investigations not directly industrial. In the department of industrial hygiene, considerable attention was given to problems relating to tuberculosis, especially as manifested by natives employed in the mines. Comparative study suggests that exposure to hard and unfamiliar climatic conditions is almost more important in breaking down resistance to tuberculosis than is exposure to the conditions of mining on the Witwatersrand. Experimental work on dust inhalation was continued, particularly into tissue reactions to insoluble dusts, and into the possible relation of silica dust in the lungs to the cytology of pneumonia.—E. L. C.

INDUSTRIAL DISEASES AND PUBLIC HEALTH. *W. C. Hassler. Abstr. as follows from California and Western*

Med., June, 1929, vol. 30, p. 413, in Jour. Am. Med. Assn., Aug. 3, 1929, vol. 93, p. 412.

Hassler contends that the state should enforce compulsory education of men and women in industry concerning special hazards of their work, as well as industrial and home hygiene. The co-operation of unions, lodges, and insurance societies should be sought in the holding of lectures and clinics, and in the demonstration of protective and preventive measures and first aid along the lines now practised by the Bureau of Mines, the telephone companies, and other organizations. Physical examinations and issuance of health cards to all workmen and women prior to employment should be required, and as often thereafter as the hazards of the industry indicate, in order better to maintain health. Such complete examinations should be made in every instance at least once a year. A physical survey should be made of individuals engaged in the various industries for the purpose of establishing health standards. Mortality and morbidity data should be collected and compiled; and reports and other information for the instruction and benefit of both the workman and the public should be published. A uniform method for recording medical data and records should be adopted. Health and industrial authorities and social agencies should have co-operation in investigating and correcting problems connected with industrial hygiene. The scope and the work of social service and industrial welfare bodies should be encouraged and broadened. Endeavor to bring about facilities not only for physical examinations but for medical and dental nursing service in all places of employment should be made. Legislation should be promoted to compel all cities of the first and second class to establish disinfecting stations as prophylactic and public health measures. Universities should be encouraged to provide in their medical schools facilities for the proper teaching and training of medical practitioners in industrial medicine.—K. R. D.

Occupational Diseases of Hop Picking. *B. M. Smithies. Abstr. as follows from Lancet, Sept. 7, 1929, vol. 2, p. 494, in Jour. Am. Med. Assn., Oct. 19, 1929, vol. 93, p. 1258.*

There are three recognized conditions due to hop picking, and seen only among hop pickers. These are known as "hop rash," "hop eye," and "hop gout," and are familiar to those who have worked in and among hop gardens. Smithies relates her experience as medical officer to the Hop Pickers' Hospital and Dispensaries at Marden in 1927.—K. R. D.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

Arterio-Sclerosis in Coal Miners. *D. E. Dickson and W. A. Dickson. Brit. Med. Jour., Dec. 14, 1929, vol. 2, pp. 1103-1106.*

Mortality among British coal miners is below the standard up to age 55; but thereafter it is in excess. The authors examined 500 colliers (taken

haphazard) who were employed in Scotch coal mines in Fife. Arterial thickening was found so prevalent that only 9 per cent. had arteries which could not be palpated; even healthy youths of 14 to 20 years of age presented thickened radials—100 out of 116 examined—while after age 40 all radials were palpable. Examination of radial arteries from men who had met with fatal accidents disclosed thickening in the intima coat which does not involve the whole circumference of the vessel, the muscular coat, or adventitia. No relation was found between blood pressure and thickening of the arterial wall; in one case quoted, thick and tortuous arteries from wrist to axilla went with a pressure of 118. Generally the majority had normal pressures.

No essential relation was found between alcohol consumption and thickening of the arteries or the blood pressure; nor was it found that meat consumption, or the use of tobacco caused any change. Finally, the suggestion is advanced that occupational conditions, the unusual amount of carbon dioxide in the inspired air and the absence of daylight, may be responsible. The arteriosclerosis found is put forward as the explanation of the high mortality in late years of life.—E. L. C.

CANCER; ITS AETIOLOGY AND ARTIFICIAL PRODUCTION. *J. Oliver. Med. Press and Circ., Sept. 18, 1929, pp. 231–234.*

The writer suggests that as cancer produces metastatic growths, by way of the lymphatics, a fatty substance may be presumed to be the immediate agent in its production. This he supports by the observation that the barn door fowl is so frequently the bearer of neoplasms which can be classed as malignant. Nine per cent., of even young birds, undergoing intensive feeding are the bearers of endothelial tumors showing metastatic outgrowths. Rono found that by combining kieselguhr, which contains 63 per cent. of soluble silica, with his injection of sarcomatous filtrate into fowls, the infectivity of the new growth was intensified. The lip cancer of the clay pipe smoker, Oliver brings forward as an example of the interaction of silica upon the cholesterol of the tissues. This reaction, plus heat, produces naphthalene, which he thinks accounts for these lip cancers. This chemical he indicated as being the likely cause of chimney sweeps' epithelioma. The naphthalene of the soot is said to come readily into contact with the chlorine of the cells, the metabolism of which becomes thereby seriously affected.

The observation that gas works pitch and tar are more carcinogenic than those from blast works is ascribed to the much more intense and energetic oxidation which takes place in the latter. The gas works products are practically unoxidized at the temperature at which they are produced. Temperature *per se* does not influence the cancer producing properties of pitch. In the blast furnace the naphthalene, which is the active agent in the production of pitch cancer, by energetic oxidation is converted into a "phthalic" and substituted phthalic acids. These substances are innocuous.

In mule spinners the lubricating oil enters the hair follicles and sebaceous

glands and, mingling with the subcutaneous fat, causes a substitution of chlorine for hydrogen. This is known as metalepsis; a reaction which undoubtedly plays a more or less important part in the precancerous chemical change. In discussing the formation of bladder tumors in dye workers, the writer affirms that the endogenous factor primarily associated with malignant changes in the epithelial cells of the bladder is the element chlorine. This element is essential to all cell division and multiplication.

Oliver sums up as follows: "It would appear that some chlorine derivative of the naphthalenes is necessarily concerned in the production of cancer."—R. P. W.

PAPILLOMA OF THE BLADDER. *J. B. Macalpine. Brit. Med. Jour., Nov. 2, 1929, vol. 2, pp. 794–799.*

This paper is based on ninety-one cases of papillomatous disease seen in ten years; of these, six occurred in workers in aniline factories. One was a recurrent case seventeen years after the original operation. Prior to the formation of a neoplasm, these workers experience frequency of micturition, strangury, and sometimes hematuria. Change of occupation at this stage is sometimes followed by entire disappearance of all symptoms, but a growth may ensue several years later. Early operation is simple and successful.—E. L. C.

THE INCIDENCE OF CHRONIC NEPHRITIS AMONGST YOUNG PEOPLE IN QUEENSLAND. *D. G. Croll. Med. Jour. Australia, Aug. 3, 1929, vol. 2, pp. 144–145.*

AN INVESTIGATION OF THE EXTRAORDINARY INCIDENCE OF CHRONIC NEPHRITIS IN YOUNG PEOPLE IN QUEENSLAND. *L. J. J. Nye. Ibid., pp. 145–159.*

The first paper establishes the fact that in recent years, 1917 to 1926, chronic nephritis has claimed many more deaths than usual between ages 10 to 40 for both sexes, a comparison being made with other Australian states. The mortalities per 800,000 population for Queensland were 574 between the ages 20 to 29 and 496 between the ages 30 to 39, compared with 115 and 234 for New South Wales, 119 and 249 for Victoria, and 102 and 242 for South Australia.

In the second paper a reason is sought. Evidence is presented for concluding that the origin of the trouble is lead poisoning in childhood. Certainly in the Brisbane hospital for children, 428 cases of plumbism were inpatients, 1917 to 1926, as compared with 4 in the children's hospital of Sydney, 3 in Melbourne, and 1 in Adelaide. Further, a history of lead poisoning in childhood was obtained in 14 out of 80 cases of nephritis. The origin of the poisoning is ascribed to lead paint used to protect wooden houses; 85 per cent. of the houses in Queensland are of wood, as compared with 48 per cent. in New South Wales. Queensland is mainly within the tropic zone, and the sun dries the paint into a powder which is readily brushed off. Children are usually confined to the verandas as a safe playground; here they handle the painted wood and then suck their fingers; or they lick the droplets of rain from the railings. The investigation reported is an interesting medicosocial study.—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

TOXICOLOGICAL STUDIES OF ANILINE AND ANILINE COMPOUNDS. III. TOXICOLOGICAL AND HAEMATOLOGICAL STUDIES OF ACETANILIDE POISONING. *A. G. Young and J. A. Wilson. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1926, vol. 27, p. 133, in Physiol. Abstr., Jan., 1930, vol. 14, p. 593.*

The symptoms are the same as those of aniline poisoning. The statements in the literature that methemoglobin is formed are shown to be based on insufficient evidence. The brown color of the blood is due to the presence of paraminophenol.—C. K. D.

ACUTE POISONING CAUSED BY A TINCTURE FOR SHOE DYEING. *L. E. Alcayaga and A. Bercovich. Abstr. as follows from Semana méd., 1929, vol. 36, pp. 642–648, in Chem. Abstr., Oct. 10, 1929, vol. 23, p. 4743.*

A solution of an aniline dye in 75 per cent. alcohol absorbed from wet shoes caused bluish color over the whole body and blue vision (cyanopsia) but no important subjective symptoms. A general review of dye poisoning is given.

TISSUE OXYGEN TENSION AND CARBON MONOXIDE POISONING. *J. A. Campbell. Jour. Physiol., Oct. 23, 1929, vol. 68, pp. 81–96.*

1. During the first few days of carbon monoxide poisoning, the tissue oxygen tensions are lowered to a more marked degree than by a similar loss of function of hemoglobin due to bleeding or hemolysis; this agrees with J. S. Haldane's prediction. A similar, but not so marked, difference applies to the carbon dioxide tensions in the tissues.

2. It is possible for animals (rabbits, rats, mice, guinea-pigs) to tolerate about 0.25 per cent. of carbon monoxide in the air for several days after some degree of acclimatization, whereas 0.15 per cent. of the gas is not tolerated for three days by unacclimatized animals.

3. Even when an animal is exposed to gradually increasing percentage of carbon monoxide, the tissue oxygen tensions are abnormally low, although there is increased breathing and also great increase in the hemoglobin content per cubic millimeter of blood. At the same time the tissues show marked histologic evidence of disintegration, extreme congestion of the liver with atrophy of liver cells being the outstanding feature, for which heart failure is held mainly responsible. Power to tolerate carbon monoxide depends upon the powers of the vital organs, particularly the heart, to continue to function under a low tissue oxygen tension.

4. The resemblance between the effects (physiologic and pathologic) of carbon monoxide poisoning and of exposure to low oxygen pressure in the air is striking.

5. The carbon monoxide tension in the tissues has been measured; usually it is about one-third of that in the inspired air. The low carbon monoxide tension in the tissues is due to the very low oxygen tension (1 to 3 per cent.) which exists in the tissues, the

reduced blood in the capillaries carrying the carbon monoxide back again to the lungs.—*Author's Summary.*

SIMPLIFIED IODINE PENTOXIDE APPARATUS FOR DETERMINATION OF CARBON MONOXIDE IN FLUE GAS. *F. E. Vandaveer and R. C. Gregg. Indust. and Engin. Chem., Analyt. Ed., July 15, 1929, vol. 1, pp. 129–133.*

The iodine pentoxide apparatus developed by the United States Bureau of Standards and the American Gas Association Testing Laboratory may be used successfully for routine analysis of carbon monoxide in concentrations as low as 0.002 per cent. in the products of gaseous combustion when: (1) carbon dioxide, oxygen, hydrogen, methane, ethane, hydrogen sulphide, sulphur dioxide, nitrogen, and oxides of nitrogen are present in small quantities; (2) formaldehyde is present in less than 1 per cent. if one chromic acid tower is heated to 100°C. Correct readings cannot be secured where relatively large quantities, 0.04 to 1.9 per cent., of ethylene are present in the products of combustion.—*Author's Summary.*

CHROMIUM. *Health Practices Pamphlet No. 1, Nat. Safety Council.*

This is a summary of the available information regarding the chromium hazard in industry.

CHROMIUM PLATING. *Industry Rep., Retail Credit Co., July, 1929, vol. 4, pp. 1–6.*

This gives valuable information on health, safety, and occupational data.

EARLY GANGRENE DUE TO OXALIC ACID IMMERSION: CASE. *M. Grolnick. Abstr. as follows from New York State Jour. Med., Dec. 1, 1929, vol. 29, p. 1461, in Jour. Am. Med. Assn., Jan. 4, 1930, vol. 94, p. 63.*

Grolnick relates the case of a painter who had been scrubbing floors with a solution of oxalic acid for two years at infrequent intervals, and for only a short period of time, in the course of his regular painting jobs. However, during the two previous months he had devoted to it as much as twelve or fifteen hours a week. Furthermore, he had never adopted the protection of rubber gloves. On the day before he consulted Grolnick, soon after one of these floor washings, the patient noticed a drawing pain under the nails of the fingers of both hands. Later the fingers became stiff, so that he was able to flex them only with difficulty. During the night the pain became so severe as to cause insomnia. The complaints were more marked in the right hand. The right hand showed a deep cyanosis from the finger tips to beyond the wrist. The color was not uniform but presented a mottled appearance, with areas of lesser cyanosis. The nails were yellow, exhibiting none of the normal pink hue. The soft tissues of the hand, particularly the terminal phalanges, were very tense. There was only slight ability to flex the fingers. The hand felt cold to touch, and sensation was numbed. The left hand gave a mottled appearance of blue and pink, interspersed. The tissues were less tense, sensation was present, and moderate flexion of the fingers was possible. Grolnick considered the case one of early gangrene, especially of the skin, due to immersion in the caustic oxalic acid solution, the effect probably being similar to that

produced by continued local applications of strong phenol solutions. He prescribed hot epsom salt baths, dry heat, and woolen wrappings around the hands. The next day the patient stated that the pain was nearly gone. He was able to move the fingers on the left hand freely, and had about 50 per cent. flexion in the fingers of the right hand. In a few more days he had no more discomfort and returned to work.—K. R. D.

LEAD. *Abstr. from Health Practices Pamphlet No. 3, Nat. Safety Council, 1929, pp. 7, in Am. Jour. Pub. Health, Aug., 1929, vol. 19, p. 937.*

The more dangerous lead trades are specified as well as the commoner lead compounds. The toxicity of lead compounds is briefly discussed with a paragraph upon the portals of entry into the body and several upon the fate of lead compounds in the body. A synopsis is given of the diagnosis of lead poisoning, the chief clinical manifestations, the distinction between lead absorption and lead poisoning, and particular attention is given to the prevention of lead poisoning, as regards both the individual employee and his place of employment. A short bibliography follows. Illustrations show the lead line in the gums, wrist drop, stippled red cells, and a proper exhaust system for the protection of workers. There is also a special form for employment and periodic examination of lead workers.

THE EXCRETION OF LEAD IN URINE. *H. Millet. Abstr. as follows from Jour. Biol. Chem., 1929, vol. 83, pp. 265–268, in Chem. Abstr., Oct. 20, 1929, vol. 23, pp. 4971–4972.*

The excretion of lead in the urine was determined electrometrically. Cancer patients who had received injections of colloidal lead phosphate and those not treated with lead showed the same rate of excretion of lead. There is a definite normal excretion of lead in urine.

OCCUPATIONAL INTOXICATION BY LEAD TETRAETHYL. *F. H. de Balsac, E. Agasse-Lafont, and A. Feil. Abstr. as follows from Chim. et indust., Feb., 1929, Special No., p. 740, in Chem. Abstr., Sept. 20, 1929, vol. 23, p. 4563.*

A brief discussion of the danger of acute or chronic saturnism attending the use of lead tetraethyl.

TETRAETHYL LEAD, A NEW SOURCE OF SATURNISM. *G. Ichok. Abstr. as follows from Presse méd., 1928, vol. 36, pp. 1127–1128, in Chem. Abstr., Sept. 20, 1929, vol. 23, p. 4563.*

The physiologic and toxicologic actions are described, and treatment with sodium bicarbonate or magnesium oxide is recommended. The prophylaxis is discussed.

MERCURY POISONING. *R. N. V. Podroužek. Abstr. as follows from Chem. Listy, 1929, vol. 22, pp. 529–531, in Chem. Abstr., Oct. 10, 1929, vol. 23, p. 4742.*

Mercury poisoning is more hazardous than lead; the poisoning remains concealed, and characteristic symptoms are manifested only in later stages of the intoxication. Less than a milligram of mercury vapor per cubic meter of air is considered dangerous. This concentration may be produced by open manometers, gas pipettes,

tensiometers, mercury cups, and contacts used in laboratories. Symptoms and diagnoses are discussed.—P. D.

RADIUM POISONING. *U. S. Month. Labor Rev., June, 1929, vol. 28, pp. 1200–1241.*

This is a report of a study made by the United States Bureau of Labor Statistics to determine the effects upon the health of workers of the use of radioactive substances, especially in the luminous dial painting industry. The investigation proved that luminous dial painting is deadly under the old methods; the newer methods, even where they have been installed, have not been in operation long enough to prove whether or not they are less deadly. Recommendations are made as to the precautions which are regarded as necessary to be taken by persons engaged in the manufacture, handling, or use of these materials.

TOBACCO PRODUCTS. *Industry Rep., Retail Credit Co., June, 1929, vol. 4, pp. 1–9.*

This includes a classification of jobs and a list of potential health hazards associated with tobacco products.

TURPENTINE. *Industry Rep., Retail Credit Co., May, 1929, vol. 4, pp. 1–6.*

A classification of jobs and a list of potential health hazards associated with turpentine are given.

DUST HAZARDS AND THEIR EFFECTS

HAZARDS IN THE USE OF DELAY-ACTION DETONATORS IN COAL MINES. *D. Harrington and S. P. Howell. Abstr. as follows from U. S. Bur. Mines, Information Circ. No. 6147, 1929, pp. 2, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4343.*

In using delay-action detonators gas or dust may be released by the cut shot to form dangerous explosive atmospheres in the coal mine, and the atmospheres may be exploded with serious results by the dependent shots fired by the delay-action detonators.—P. D.

COAL-DUST EXPLOSIONS IN MINES. CAUSES, EFFECTS, AND RECOMMENDATIONS FOR PREVENTION. *G. S. Rice. U. S. Bur. Mines, Tech. Paper 448, 1929, pp. 24.*

Data and conclusions from numerous publications of the Bureau of Mines are here given in condensed and especially readable form—one reference only is included and no tables or illustrations. The paper is admirably suited to those who wish a practical working knowledge of the subject. The author is an internationally recognized authority on coal dust explosions and their prevention.—P. D.

SAMPLING DUST IN ROCK-DUSTED MINES. *C. W. Owings. Abstr. as follows from U. S. Bur. Mines, Information Circ. No. 6129, 1929, pp. 8, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4343.*

The methods advocated for sampling are described in detail, with examples from practice. It is recommended in the interest of safety that a set of samples be taken through the mine at least once each month.—P. D.

A Gas Explosion in a Rock-Dusted Mine. *G. S. McCaa. Abstr. as follows from U. S. Bur. Mines, Information Circ. No. 6144, 1929, pp. 5, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4343.*

The explosion occurred at a place in the mine where the fall of the coal deposit had been pushed back 38 feet from the rock dusting and at a time when the rock dusting machine and a car of rock dust was being pushed to the spot by an electric locomotive. Evidently gas in considerable concentration accumulated at the high point and the mixture was ignited possibly by a stray electric arc. The explosion extended but little beyond the gas filled area, and did not extend through the rock dusted mine.—P. D.

The Health of Workers in Dusty Trades. II. Exposure to Siliceous Dust (Granite Industry). *A. E. Russell, R. H. Britten, L. R. Thompson, and J. J. Bloomfield. U. S. Pub. Health Bull. No. 187, July, 1929, pp. 206.*

A special summary of this report, prepared by L. R. Thomspon and R. H. Britten, will be published in a later number of Volume 12 of This Journal.

Occupational Diseases among Pearl Button Workers. *R. Bernstein. Abstr. as follows from Zentralbl. f. Gewerbehyg., May, 1928, N. S. vol. 5, pp. 135–138, in Bull. Hyg., Dec., 1929, vol. 4, pp. 980–981.*

The author discusses the possibility of occupation in polishing pearl buttons (with inhalation of the dust) as the cause of periosteal swellings on the right and left lower maxillae and later on a rib and shoulder blade. The case was that of a soldier who obtained compensation in 1919 for a wound on the right side. There was then no question of a wound of the head.

Between 1922 and 1924 he came for examination frequently because of extensive swellings on the right and left lower jaws which were attributed to a tooth extraction. Later a wound of the jaw was alleged to have been received during the War and compensation was awarded. As this wound was not alleged until six years after its occurrence the author is doubtful about the truth of the story.

He ascertained that the man took up the occupation of pearl button worker in 1921 and it was in the year following that, that the swelling of the jaw appeared. Recurrent periostitis of pearl button workers was first described in 1869. Its cause is believed to be either the conchiolin (the organic substance of the pearl mussel) or in the organic matters clinging to the surface of the shell which are removed in polishing. It affects young workers almost exclusively after an employment of several months; inflammatory swellings occur on several bones, which become bone hard and disappear either of themselves or on administration of potassium iodide. Descriptions of the condition date from days before roentgen rays and the author was unable to hear of any X-ray photographs of the condition. He says "when mother of pearl periostitis was first observed there was no X-ray apparatus; later when X-ray apparatus existed no one seems to have thought of effects from mother of pearl."

The author, in view of the fact that several bones one after the other be-

came affected, considers his diagnosis of pearl button disease the most likely. He wishes more attention would be given to this malady by those—medical inspectors of factories, works' surgeons, etc.—who have the opportunity. Following on the case in question he made some inquiry and within a year came across two cases which he cites as probably due to inhalation of dust from pearl button manufacture.—T. M. L.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

OCCUPATIONAL DERMATITIS. *U. S. Month. Labor Rev., April, 1929, vol. 28, pp. 782–783.*

"The widespread occurrence of occupational dermatitis is shown by a study made by the New York Bureau of Women in Industry, an account of which was published in the Nov., 1928, number of the *Industrial Bulletin*, issued by the State department of labor. The term 'industrial dermatitis' is used to cover all skin irritations caused by any material or substance used in the individual's work and it may vary from a very mild case showing only a slight reddening of the skin to a very severe generalized inflammation of the skin covering the greater part of the body."

Data covering a group of 390 cases of dermatitis directly traceable to industrial causes were secured from hospital clinics and from the workmen's compensation bureau. In the majority of the cases the dermatitis was confined to the hands and arms; ninety-one cases began on the hands but spread to other parts of the body; thirty cases were primary to other parts of the body, chiefly the legs. This last group comprised two types of workers, those who stood in water and those who got their overalls and shoes full of substance, such as cement.

There were thirty-four known agents causing the dermatitis, the most important of which were: soap and soap cleansers; dyes; lime; lead; ink; flour, sugar, and cinnamon; oil; chromic acid; methyl alcohol; and lotions.

Of the total number of cases, 120 occurred among women, and nearly three-quarters of these cases occurred among houseworkers. Of the other occupations in which women were affected, stenographing was responsible for the largest number of cases, contracted from constant handling of carbon paper.

In 24.4 per cent. of the total group of cases disability lasted more than one year; in 16.4 per cent. it lasted for from four to six months; in 21.5 per cent., for from one to three months; and in 14.9 per cent., for from two weeks to one month.

INK IMPRESSIONS OF THE HAND IN STUDY OF OCCUPATIONAL SKIN CHANGES. *M. Oppenheim. Monatschr. ungar. Med., 1928, vol. 2, p. 244.*

SKIN IRRITANTS. *Am. Jour. Pub. Health, April, 1929, vol. 19, pp. 366–376.*

This Report of the Committee on Skin Irritants reviews the literature on the subject from 1925 to 1928 and classifies and correlates it.

By way of conclusion the Committee emphasizes the importance of industrial dermatitis to the industrial

physician, the necessity of detailed study of cases and consideration of all possible irritants to which the worker is exposed, of noting extent and duration of exposures, of considering the personal and group factors influencing susceptibility, and of not overlooking the importance of the epidermophytons and of pyogenic infections as contributing causes or reasons for slow healing.

Few substances used in industry act as irritants to all skins and few will not irritate especially susceptible skins, whether susceptibility is due to idiosyncrasy, sensitization, or constitutional disease.

In general, protection of exposed skin, thorough cleansing after exposures, and the use before work of protective substances such as petrolatum, lanolin, or vegetable gum pastes, and the use of similar substances after cleaning on skins deprived of natural protecting oils will prevent many cases of skin irritation. While there are few if any specific carcinogenic substances, a variety of organic oily substances will so act on predisposed skins.

PARAFFIN DISEASE. *V. Popel. Abstr. as follows from Azerbeidyanskoe Neftyanoe Khoyaistvo, 1929, No. 2, pp. 86–87, in Chem. Abstr., Sept. 20, 1929, vol. 23, p. 4563.*

Symptoms of the paraffin disease are described. The disease is probably due to resins dissolved in the paraffin wax and absorbed by the skin. It can be avoided by cleanliness and by the use of a neutral fat, which must be rubbed in before coming in contact with the paraffin.

A CASE OF MELANOSIS OF RIEHL. *M. Burnier and O. Eliascheff. Abstr. as follows from Arch. dermat.-syph. de l'hôp. St.-Louis (Paris), March, 1929, vol. 1, p. 182, in Arch. Dermat. and Syph., Nov., 1929, vol. 20, p. 716.*

The patient was a woman, aged 53. The disease was practically confined to the neck, appearing as brownish pigmentation in areolar pattern. There was a faint associated atrophy. In this case the etiologic hypothesis of Habermann that the disease is due to a photodynamic substance derived from tar distillate, thus a dermatosis industrialis, could be sustained with some probability.

RÔLE OF SENSITIVENESS TO LIGHT IN MELANOSES CAUSED BY DERIVATIVES OF COAL AND OF PETROLEUM. *E. Liebner. Monatschr. ungar. Med., 1928, vol. 2, p. 313.*

INFLAMMATION OF THE LIDS FROM WORKING ON TEAKWOOD. *E. Reuscher. Abstr. as follows from Klin. Monatsbl. f. Augenh., June, 1929, vol. 82, pp. 802–805, in Am. Jour. Ophth., Oct., 1929, vol. 12, p. 870.*

After carpenter work with teakwood a man aged 21 years noticed in the evening an intense dermatitis of the lids with swelling and itching, which disappeared within ten days. As this did not recur when the man resumed the same kind of work, the author assumed a desensitization by the first dermatitis.

PROTECTIVE MEASURES FOR THE PREVENTION OF INJURIES TO THE EYE AND TO OTHER ORGANS IN RAILWAY SHOPS. *V. P. Kalashnikov. Abstr.*

as follows from Russk. Opht. Jour., Aug., 1929, pp. 179–198, in Am. Jour. Ophth., Jan., 1930, vol. 13, p. 92.

In order to reduce occupational traumatism of the eye, which has increased in Soviet Russia to an alarming degree, the author advocates the following measures: preliminary training of workers in schools connected with large railway shops; thorough physical examination of students in these schools with a view of eliminating those unfit for the work; introduction of protective apparatus for the eyes and other organs; a study of similar prophylactic measures in other countries, particularly in the United States of America; general hygiene in work; propaganda among workers urging them to obey the rules established for the protection of their health.

PERFORATING INJURIES OF THE EYES. *N. J. Medwedjew. Abstr. as follows from Hirschmann Memorial Hosp. Pub. (Charkow), 1929, vol. 1, p. 31, in Am. Jour. Ophth., Jan., 1930, vol. 13, pp. 93–94.*

The author points out a striking change in the relative importance of the factors causing blindness in Russia, where the number of blind is estimated at 300,000 (Golowin) to 500,000 (Braunstein). While in 1905 trachoma caused 21.4 per cent., glaucoma 19.2 per cent., smallpox 12.1 per cent., and injuries 3.7 per cent., in 1925 trachoma caused 17.97 per cent., glaucoma 6.7 per cent., smallpox 4.57 per cent., injuries 20.96 per cent. of blindness. The rise of trauma as a factor is principally due to the intensive industrialization of Russia since the revolution, and the constantly increasing drafting into industry of new and unskilled elements from among the peasantry unaccustomed to working with machines. From 50 to 65 per cent. of all industrial accidents are estimated to be due to carelessness of workers themselves. About 25 per cent. are considered inseparable from industry, while the management is held responsible for 50 to 25 per cent. The greater registration incident to the increased facilities for treatment and to the operation of accident insurance laws, however, explains much of this apparent increase of incidence of industrial accidents. Industrial injuries in general are less frequent than in Germany, although they are more frequent than in the United States. Depending upon the industry and the locality, injuries to the eyes range from 3.7 to 21 per cent. of all industrial injuries, the higher figures occurring in the metallurgic industries.

Interesting figures regarding perforating injuries to the eyes at the Hirschmann Memorial Hospital are given. Of all eye cases seen, 5.9 per cent. were injuries, and of those hospitalized for injuries, 72.1 per cent. were for perforating injuries. The right eye was slightly more often injured than the left. Tetanus was never met with, although the wounds were frequently very dirty. Iron and steel particles were responsible for 40 per cent. of the injuries. Explosions of bullets and other explosives accounted for 11.3 per cent. Glass particles were rare and those from breakage of lenses extremely rare. Glass was found well tolerated by the retina. About a third showed the foreign body in the eye; about a third of these involved the lens, and all such cases showed cataract; about a third showed in-

flammations of the uveal tract. Hirschberg's hand magnet enabled the author to remove 50 per cent. of all magnetic intraocular bodies. Of perforating injuries, 34.6 per cent. led to immediate blindness, and 51.3 per cent. ended in blindness eventually; 15 per cent. retained useful vision (0.05 to 0.5 per cent.), and only 4.3 per cent. retained good vision (above 0.5).

Results of prophylactic work in one factory are shown by the following figures: In 1924 there were 119 eye injuries per 100 workers, and twenty eyes were totally lost. In 1925, after the introduction of protective goggles, there were sixty eye injuries per 100 workers, and ten eyes were totally lost. In 1926, twenty-one eye injuries were reported, including one serious injury, and in 1927 only three injuries, including one serious, were reported.

PERFORATING INJURIES OF THE EYE BY SMALL STEEL FRAGMENTS. *H. L. Eegle. Am. Jour. Ophth., Dec., 1929, vol. 12, pp. 970–977.*

A number of cases of injury by small particles of steel are briefly described, to illustrate (1) the direct ratio between severity of injury and size of foreign body; (2) the influence of the location of entrance upon the amount of permanent disturbance; (3) the occasional freedom of the crystalline lens from important opacity secondary to its penetration by steel fragments; (4) the difficulty of removing steel fragments from the crystalline lens after the capsule is once healed; and (5) the problem whether a very minute steel particle may ultimately be quite absorbed and disappear from the tissues of the eye.

TRAUMATIC CHORIORETINITIS. *W. C. Bane. Am. Jour. Ophth., July, 1929, vol. 12, pp. 591–592.*

This is the case report of a machinist, 22 years of age, who had been struck in the left eye with a hot metal shaving about an inch in diameter.

THE ACTION OF LIGHT UPON THE EYES OF CINEMA WORKERS. *E. A. Hoorgina. Abstr. as follows from Russk. Opht. Jour., April, 1929, vol. 9, pp. 441–449, in Am. Jour. Ophth., Nov., 1929, vol. 12, p. 945.*

The author examined 205 cinema workers divided into the following three classes: (1) mechanics who handled the illuminating equipment, *i.e.*, the arc lights and mirrors; (2) directors and their assistants; (3) actors. He found a simple conjunctival congestion to be prevalent among the members of the first two groups, but he attributed that to irritation by dust in the studios. A follicular hypertrophy of the conjunctiva, which had a tendency to disappear after discontinuing the motion picture work, was present among the members of all groups examined and was due, in the author's opinion, to the action of the light rays. The most serious eye complication caused by the action of the arc lights was a superficial keratitis. This was found almost exclusively among actors, particularly the inexperienced ones, and was the result of direct and prolonged exposure to light.

GLASS BLOWERS' CATARACT AT THE BUELACH GLASSWORKS WITH OBSER-

VATIONS ON DETACHMENT OF THE ANTERIOR LAMELLAE OF THE LENS CAPSULE. *A. Vogt. Abstr. as follows from Schweiz. med. Wchnschr., May 4, 1929, vol. 59, p. 475, in Am. Jour. Ophth., Nov., 1929, vol. 12, p. 942.*

The experimental and clinical evidence for the author's well-known opinion that the exclusive causative factor in glass blowers' as well as smelters' and blacksmiths' cataract is the infra-red rays is reviewed. He points out that experimentally only the short-waved infra-red rays, those between 800 and 2,000 micromillimeters, have produced cataract, that this has been accomplished without injury to the cornea, thus ruling out the agency of heat rays, and that clinically the eye nearest the incandescent mass is the first to be affected. Specific sensitiveness of the lens to infra-red radiation is assumed. The slit-lamp has shown that, in addition to the axial lens opacities characteristic of infra-red cataract, there is an annular, complete or partial detachment of the anterior lamellae of the anterior lens capsule. This begins axially from the zonule, at the line of cleavage where the break in the capsule in subluxation has also been shown to occur, and extends to the pupillary zone, where it remains attached. The rolling forward of the detached membrane into the anterior chamber, with the attached pupillary capsule, forms the characteristic more or less cup shaped cuticle. This cuticle is only found in persons over 40 years, and age must be a factor in its formation. The same process is involved in the production of capsulocuticular glaucoma, except that here the cuticle is fragile and crumbles, while in glass blowers' cataract it has retained its elasticity. Blue-green (ferrous oxide) goggles are advocated as a protection for the Buelach workers who manufacture green bottle glass, on the principle that absorption equals emission.

OCULAR LESIONS PECULIAR TO THE ARTIFICIAL SILK INDUSTRY. *Colrat. Abstr. as follows from Arch. d'opht., July, 1929, vol. 46, p. 416, in Am. Jour. Ophth., Jan., 1930, vol. 13, p. 92.*

The nontraumatic lesions in this industry consist of a conjunctivitis and, when more severe, a superficial keratitis with the subjective symptoms of tearing and photophobia. The condition clears rapidly, upon keeping the patient away from the workroom, with the use of cocaine ointment and cold applications in the more severe type. The chief source of disturbance seems to be fumes of sulphuric acid products, and by proper ventilation the incidence is reduced. The viscose contains caustic soda, and when splashed into the eyes it produces caustic burns. All particles must be carefully washed out or removed and the formation of symblepharon avoided if possible.

MONOCULAR BLINDNESS FROM LIGHT OF ELECTRICAL ORIGIN. CASE REPORT. *J. N. Roy. Am. Jour. Ophth., Oct., 1929, vol. 12, pp. 822-824; Canadian Med. Assn. Jour., Dec., 1929, vol. 21, pp. 691–694.*

The patient watched electric welding for about eight minutes at a distance of 4 or 5 feet, without protective glasses. A double ophthalmia, complicated by cloudy vision of the right eye, left as terminal conditions several retinal lesions and an atrophic nerve

head; and the vision of this eye was almost entirely lost. The literature of the subject is reviewed, and the pathology discussed.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

THE VALUE OF THE FLUOROSCOPE AS AN ADJUNCT TO ROUTINE PHYSICAL EXAMINATION OF THE CHEST. *A. C. Reid. Am. Rev. Tuberc., July, 1929, vol. 20, pp. 46–51.*

Of 4,883 applicants, who were passed on physical examination, fifty-nine, or 1.21 per cent., were demonstrated with the fluoroscope to have pulmonary pathologic changes, which, after the X-ray films were studied, were classified as anatomic tuberculosis. Of these fifty-nine cases, thirty-five reported again for examination within the year, and sixteen, or 45 per cent., were diagnosed as having active progressive tuberculosis.

The author concludes that "In the absence of physical signs it is possible to demonstrate pulmonary pathological changes by means of the fluoroscope with sufficient accuracy to render the procedure a most valuable adjunct to the routine physical examination of young adults."

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

TECHNOPSYCHOLOGY IN A SWISS INDUSTRY. *L. Walther. Personnel Jour., June, 1929, vol. 8, pp. 1–18.*

"This paper describes the difficulties, aims, methods, and results of applying psychological principles and techniques in a century-old factory in Switzerland. The problems were those of personnel classification and placement, simplification of work through time and motion studies, reduction of fatigue, and increase of output without speeding up the workers. The difficulties were (1) the apparent impossibility of introducing improvements, so skillful seemed the workers and so well organized the plant; (2) many workers were beyond the age when habits are readily modified, forty per cent being between 40 and 60 years old; (3) the employees were as well paid as others similarly employed: they were, therefore, without the usual incentive to coöperate in plans for reorganization.

"About 230 women workers in 11 departments were studied. They were largely engaged in machine tending or in such manual work as wrapping and packing. . . . .

"Tables of percentile scores permitted comparisons of departments as well as individuals. The psychological survey having shown that the age of the workers accounted for a relatively low dexterity rating, various aids to improvement and to conservation of the workers were employed: rest periods, linked movements, automatized movements, variety in work,

reorganization of flow of work, and changes in belt-conveyors and work tables to meet the requirements of comfort, convenience and ease of movement.

"Changes resulting in better placement and training, improved working conditions, and an increased output of from 30 to 40 per cent without speeding up, are reported."

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

HOME OFFICE. FACTORY AND WORKSHOP ACTS, 1901 TO 1929. COTTON CLOTH FACTORIES REGULATIONS, 1929. FORM NO. 321: REGULATIONS. FORM NO. 305: HUMIDITY TABLE FOR THE PURPOSES OF REGULATION 1. FORM 1582: HYGROMETERS ORDER. *H. M. Stationery Office, May, 1929.*

STATUTORY RULES AND ORDERS, 1929, No. 300. FACTORY AND WORKSHOP. THE COTTON CLOTH FACTORIES REGULATIONS, 1929, DATED APRIL 27TH, 1929. *H. M. Stationery Office, 1929, pp. 6.*

Abstracted as follows in Bull. Hyg., Oct., 1929, vol. 4, pp. 801–802.

These Regulations constitute a considerable advance on previous legislation. The value of hygrometric readings is emphasized by a regulation which forbids the continuance of work in a weaving shed when the average wet bulb reading of all hygrometers provided in the shed exceeds 80°. All workers must leave the shed until the reading falls below 80°. Instructions are issued for taking daily readings at specified times, and prescribed forms are provided for the purpose. These forms must be preserved for a period of two years for reference. Temperatures must also be noted and kept.

Special instructions are laid down regarding the introduction of steam into weaving sheds for artificial humidification of the air. The size of the steam pipes employed must not exceed 2 inches in diameter, but if installed after April 1, 1912, the diameter shall not exceed 1 inch. The pipes must be short, and effectively covered with insulating matter which has been previously approved by the Chief Inspector of Factories.

Humid sheds erected after April 1, 1912, and dry sheds hereafter erected shall have an average height of not less than 14½ feet, with not less than 12 feet from the floor to the valley gutters.

The standard of ventilation laid down for humid and dry sheds is eight parts by volume of carbon dioxide for the former and eleven parts for the latter per 10,000 parts of air in excess of the porportion in the outside air at the time.

Other details refer to roof ventilators, adequate cloakroom accommodation, etc.

These regulations provide distinct safeguards for those employed in cotton cloth factories.—W. R.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

A NEW GAS ANALYSIS APPARATUS. THE TECHNIQUE OF GAS ANALYSIS. *E. Simonson. Abstr. as follows from Arbeitsphysiol., 1929, vol. 1, pp. 564–569, in Chem. Abstr., Nov. 10, 1929, vol. 23, p. 5206.*

Descriptions are given of minor modifications of the Haldane portable gas analysis apparatus and of an apparatus for the analysis of two samples at the same time.

AN IMPROVED APPARATUS FOR MEASURING GASES AND VAPORS IN "DYNAMIC" INHALATION EXPERIMENTS. *H. Brückner. Arch. f. Hyg., 1929, vol. 101, no. 1, pp. 16–26.*

In measuring the flow of gases for experimental purposes, it is very important that the pressure in the circuit be kept constant throughout the experimental period. Although an increase in the pressure of the gases does not change the apparent volume, the actual volume at the standard atmospheric pressure is considerably affected, since the gas is under pressure. Small changes in pressure are apt to occur if there is any resistance in the tubing between the flowmeter and the outlet where the gas is being used.

In order to avoid errors, the author recommends that a mercury manometer and a hand valve be placed im-

mediately after the flowmeter so that the manometer pressure can be kept constant by manipulating the valve.

An apparatus of this type can be used also for measuring air colloids and vapors.—W. O. K.

EXPERIMENTAL STUDIES ON THE SIMULTANEOUS EFFECT OF HEAT AND POISONOUS GASES ON THE ORGANISM. *R. Leites. Arch. f. Hyg., Aug., 1929, vol. 102, pp. 91–110.*

In animal experiments, external heat increased the poisonous effect of hydrochloric acid fumes, presumably by increasing the volume of respiration and hence the quantity of fume inhaled. This increase in toxic effect was apparent only in cases where polypnea occurred.

The action of carbon tetrachloride, on the other hand, was not affected by external heat. With high concentrations heat polypnea was absent, and with low concentrations it did not increase the action of the gas.

The important conclusion to be drawn from this study is that, in industries where toxic gases or fumes are given off, the temperature of the air as well as the concentrations of the gases should be observed.—C. P. Y.

METABOLISM OF ALUMINUM. I. METHOD FOR DETERMINATION OF SMALL AMOUNTS OF ALUMINUM IN BIOLOGIC MATERIAL. *F. P. Underhill and F. I. Peterman. Am. Jour. Physiol., Sept. 1, 1929, vol. 90, pp. 1–14.*

Idem. II. ABSORPTION AND DEPOSITION OF ALUMINUM IN THE DOG. *F. P. Underhill and F. I. Peterman. Ibid., pp. 15–39.*

Idem. III. ABSORPTION AND EXCRETION OF ALUMINUM IN NORMAL MAN. *F. P. Underhill and F. I. Peterman. Ibid., pp. 40–51.*

Idem. IV. FATE OF INTRAVENOUSLY INJECTED ALUMINUM. *F. P. Underhill, F. I. Peterman, and S. L. Steel. Ibid., pp. 52–61.*

Idem. V. RELATION OF AGE TO AMOUNT OF ALUMINUM IN TISSUES OF DOGS. *F. P. Underhill and F. I. Peterman. Ibid., pp. 62–66.*

Idem. VI. OCCURRENCE OF ALUMINUM IN HUMAN LIVER AND KIDNEY. *F. P. Underhill, F. I. Peterman, E. G. Gross, and A. C. Krause. Ibid., pp. 67–71.*

Idem. VII. ALUMINUM CONTENT OF SOME FRESH FOODS. *F. P. Underhill, F. I. Peterman, E. G. Gross, and A. C. Krause. Ibid., pp. 72–75.*

Idem. VIII. TOXIC EFFECTS PRODUCED BY SUBCUTANEOUS INJECTION OF ALUMINUM SALTS. *F. P. Underhill, F. I. Peterman, and A. Sperandeo. Ibid., pp. 76–82.*

Abstracted as follows in Jour. Am. Med. Assn., Oct. 5, 1929, vol. 93, p. 1094.

Method for Determination of Small Amounts of Aluminum in Biologic Material.—A delicate and accurate method for the sensitive estimation of aluminum in biologic material has been devised, and by its use Underhill and Peterman have established new facts regarding the metabolism of aluminum.

Absorption and Deposition of Aluminum in the Dog.—Underhill and Peterman determined definitely that aluminum occurs in the blood and tissues of normal fasting dogs. Aluminum occurs in slightly larger amounts in the blood and tissues of dogs fed a diet to which aluminum had not been added.

Therefore aluminum is present in and absorbed from the ordinary diet. Aluminum is promptly absorbed in small quantities following a single feeding of food to which it has been added. Aluminum continues to be absorbed when aluminum-rich diets are fed for various periods of time. After prolonged periods of feeding with food rich in aluminum, absorption of the metal decreases. Concomitant with the decrease in absorption there is a decrease in storage and excretion. The aluminum absorbed circulates in the blood and is stored especially in the liver, brain, kidney, spleen, and thyroid. The bile is the chief excretory path for aluminum.

Absorption and Excretion of Aluminum in Normal Man.—Continuing their research, Underhill and Peterman assert that aluminum may or may not occur in the blood of normal man. If it does occur the amount is not large, 0.21 mg. per hundred cubic centimeters being the maximum found. The aluminum content of the blood of the same normal person may vary from time to time between narrow limits. The aluminum content of the blood may show definite increase after ingestion of aluminum-rich food. More often an increase is not detected. The control subjects fed on food presumably poor in aluminum never showed an increased content of aluminum in the blood. On the contrary, the blood aluminum content usually decreased under these conditions. The urine of normal man may or may not contain small amounts of aluminum. The aluminum in the urine tends to increase after the ingestion of aluminum-rich foods. Even after the ingestion of large amounts of aluminum-rich food the total urinary excretion for twenty-four hours does not exceed 0.5 mg. of aluminum.

Fate of Intravenously Injected Aluminum.—Underhill et al. found that after the intravenous injection of aluminum salts in doses of 1 or 2 mg. of aluminum per kilogram in dogs, the metal appears promptly in the bile, lymph, and urine. As far as may be judged, this increase in these fluids does not account for the aluminum which has disappeared from the blood. This points to storage in the tissues. Aluminum is absorbed by the lymph when aluminum-rich food is fed to dogs. Aluminum is excreted through the walls of the gastro-intestinal tract at all levels. It is suggested that this gastro-intestinal elimination of aluminum may account for the failure to demonstrate large quantities of the metal in the blood after ingestion of aluminum-rich food. The aluminum and phosphorus excretion through the walls of the alimentary canal are independent of each other.

Relation of Age to Amount of Aluminum in Tissues of Dogs.—Examination of embryos, puppies, and dogs made by Underhill and Peterman disclosed that the tissues of dog embryos contain little, if any, aluminum. Tissues of puppies contain more aluminum than embryonic tissues. The lungs of puppies after five days always contain detectable quantities of aluminum. Tissues of older animals contain more aluminum than either embryonic or puppy tissues. The lungs of old dogs are very rich in aluminum. It is indicated that there exists a direct relationship between the age of an animal and the quantity of aluminum stored in its tissues.

Occurrence of Aluminum in Human Liver and Kidney.—Livers and kidneys preserved with 95 per cent. alcohol, occasionally with solution of formaldehyde, obtained at necropsy, were examined by Underhill et al. as to their aluminum content. The range found for liver was from 0.17 to 1.17 mg. per hundred grams, for kidney from 0.13 to 0.87 mg. The liver showing much the highest aluminum content was described in the necropsy report as a "fatty liver." It has previously been suggested that aluminum may be related in some way to fat metabolism. While this single result may be due to other unknown factors, it again raises the question of a relation between these two substances. Five cases in which tuberculous infection was a prominent feature show a low aluminum content for both liver and kidney, the age range being 21 to 45 years, the value for liver 0.21 to 0.34 mg. per hundred grams and for kidney 0.22 to 0.43 mg. However, these all came from districts showing a low aluminum content. It is interesting that two subjects of the same age, from the same locality, showed the same aluminum content in both liver and kidney. There is no apparent relationship between arteriosclerosis and aluminum content.

Aluminum Content of Some Fresh Foods.—Fresh vegetables, fresh fruit, and fresh meats were analyzed for their aluminum content by Underhill et al. Of all the materials analyzed, cherries and onions contained by far the largest amount. Further, both the Connecticut sour and California sweet cherries contain a large amount. The foods containing between 1 and 2 mg. of aluminum per hundred grams are lettuce, milk, flour, and liver. Liver from the calf and from the pig have practically the same aluminum content. The materials having less than 1 mg. but more than 0.2 per hundred grams are string beans, beets, cantaloup, sweet corn, peaches, pears, potatoes, and meat (beef, pork, mutton). The lean meat from three animal sources has nearly the same aluminum content. The lowest aluminum content was found in apples, eggs, oranges, and watermelon, which had less than 0.1 mg. per hundred grams. It is apparent that a diet containing liberal amounts of fresh fruits and vegetables may contain a significant quantity of aluminum. This would perhaps account for the aluminum found at times in the blood of normal man.

Toxic Effects Produced by Subcutaneous Injection of Aluminum Salts.—Rats, guinea-pigs, and rabbits were used by Underhill et al. for these experiments. The chloride and sulphate of aluminum in 20 per cent. solution in distilled water were used. Injections were made into the subcutaneous tissue of the thigh. The single lethal dose for rats is found to be from 7 to 8 gm. of aluminum chloride per kilogram. This dose produces death in from one to three days. The lethal dose for guinea-pigs was from 5 to 7 gm. per kilogram, when the initial dose was 3 gm. followed by 1 gm. on alternating days. This dose produces death in from three to seven days. The lethal dose of either the chloride or the sulphate in rabbits is from 7 to 8 gm. per kilogram, when the initial dose is from 4 to 5 gm. followed by 1 gm. on alternating days. This dose produces death in from seven to eleven

days. The symptoms produced in the three species were similar. In the pathologic results the principal features are injury to the liver and kidney, although probably the spleen shares in this, since the spleens in the rats showed congestion with paucity of lymphoid tissue and increased pigmentation. Harm to the liver and kidney is often excessive. The principal site of injury in the kidney seems to be the convoluted tubule, although the glomerular tufts are sometimes swollen. In the liver, central necrosis and sometimes fatty infiltration are noted.—K. R. D.

Effect of Aluminum on Mammalian Blood and Tissues. *F. B. Seibert and H. G. Wells. Abstr. as follows from Arch. Path., Aug., 1929, vol. 8, p. 230, in Jour. Am. Med. Assn., Sept. 28, 1929, vol. 93, p. 1021.*

Daily intravenous injections made by Seibert and Wells into rabbits of from 0.011 to 0.017 gm. of sodium aluminum sulphate per kilogram in 0.8 per cent. concentration, or of from 0.003 to 0.004 gm. of aluminum chloride per kilogram in 0.2 per cent. concentration, caused a definite secondary anemia; *i.e.*, a decrease in the percentage of hemoglobin and in the number of erythrocytes, an increase in the number of leukocytes, chiefly the mononuclears, and an increased resistance of the corpuscles to hemolysis by hypotonic salt or saponin. The final blood picture showed normoblasts, poikilocytes, anisocytes, chromatophilic cells and stipple cells. Moreover, at the site of the injection, local irritant effects appeared, such as swelling, edema, inflammation and necrosis of the tissue, and swelling of neighboring lymph nodes. Daily intravenous injections of a sulphuric acid solution, the hydrogen ion concentration of which was the same as that of the aluminum solution (3.4), produced no similar effects. An acid solution of an acidity equivalent to the maximal acidity that could be, but probably would not be, released from the sodium aluminum sulphate solution at any one time (hydrogen ion concentration 2.6) produced a decrease in the number of erythrocytes, and in one rabbit caused marked local irritation at the site of the injection. But a comparison of the results obtained with the aluminum solutions and with the corresponding acid solutions makes it probable that the changes so marked in the rabbits treated with the former were due chiefly to the aluminum ion. The feeding of small daily doses over extended periods and the feeding of large doses of aluminum compounds produced changes in the blood and the tissues which indicate that aluminum is absorbed through the intestinal tract and then exerts the same toxic effects as follow intravenous injection.—K. R. D.

Acute Aniline Poisoning. *J. Möllerström. Abstr. as follows from Acta med. Scandinav., 1929, vol. 71, pp. 73–81, in Chem. Abstr., Nov. 10, 1929, vol. 23, p. 5240.*

In a case of acute poisoning with aniline this was found in free form in the urine.

The Present Status of Benzene (Benzol) Poisoning. *C. P. McCord. Jour. Am. Med. Assn., July 27, 1929, vol. 93, pp. 280–283.*

Dr. McCord discusses various as-

pects of benzene poisoning that tend to confuse the diagnosis of this condition, and makes a special plea for: (1) the development of methods for the detection of small quantities of benzene in the presence of other solvents; (2) the development of a method for measuring individual susceptibility; (3) a study of the possible enhancement of benzene toxicity by other chemicals, such as some constituent of rubber; (4) the development of new diagnostic criteria of benzene poisoning; and finally (5) the preparation of extraordinarily pure benzene, and a study of its toxic properties in relation to various grades of commercially applied benzene.—K. R. D.

Toxic Substances in the Rubber Industry. I. Benzene. *P. A. Davis. Rubber Age, 1929, vol. 25, pp. 367–368.*

II. Carbon Tetrachloride. *Ibid., pp. 483–484.*

III. Aniline. *Ibid., pp. 611–612.*

Vocational Sickness (in the Gas Industry). *W. Leybold. Abstr. as follows from Gas- u. Wasserfach., 1929, vol. 72, pp. 825–826, in Chem. Abstr., Nov. 10, 1929, vol. 23, p. 5303.*

Attention is called to the danger of benzene vapor poisoning from leaky light oil or benzene lines and contact poisoning by tar and similar materials. Chronic carbon monoxide poisoning is rarely observed in gas works. Attention is also called to the danger of hydrogen sulphide poisoning in connection with ammonium sulphate plants.

Multiple Neuritis Following Carbon Monoxide Poisoning. *B. N. Mankowsky. Abstr. as follows from Deutsch. Ztschr. f. Nervenh., July, 1929, vol. 109, p. 84, in Jour. Am. Med. Assn., Nov. 9, 1929, vol. 93, p. 1513.*

Mankowsky discusses this occurrence on the basis of the literature on the subject and his personal experience. The case reports of seven of his patients are given, each of whom, although presenting somewhat different symptoms, was believed to have a disturbance of the peripheral nerves and vessels together with hemorrhage. Certain mechanical and traumatic factors may explain the disturbance of the circulation of blood in the extremities or other parts and the resulting hemorrhage in individual cases. Mankowsky concludes that multiple neuritis following carbon monoxide poisoning results from the compression of nerves by a hemorrhage originating from the fragility of the vessels and from the infiltration of the epineurium and the perineurium with blood and the ensuing formation of scars and ischemia of the nerves. This may occur in any nerve trunk. In most cases a number of nerves are involved. The prognosis is favorable on the whole; thermotherapy, especially diathermy, in the region of the suspected hemorrhage is indicated. The comparatively rare occurrence of multiple neuritis may in reality be a failure to recognize mild forms. This is possible in cases with edema of the extremities or with thickening of muscles due to hemorrhage.—K. R. D.

Poisoning from Cyanides in Case-hardening. *Abstr. as follows from Iron Age, May 16, 1929, p. 1343, in*

U. S. Month. Labor Rev., Aug., 1929, vol. 29, p. 353.

The hazards involved in the use of cyanides in casehardening have been the subject of special regulations in Germany, the regulations being issued by the Minister of Health.

It is required that cyanide shall be stored in vessels which can be tightly closed, and all storage and other tanks must be plainly marked to show the poisonous nature of the contents. The shop must have level, smooth floors, which must be thoroughly cleaned once each day. The article to be casehardened must be thoroughly dry when placed in the oven. The exhaust hood must fit closely and must not be opened except when the articles to be casehardened are placed in or withdrawn from the boxes or when the bath is to be recharged or emptied. The quenching vessels must be plainly marked "poison" and the quenching water must not under any circumstances be treated with acid. This water must be treated with copperas until a grayish green or blue precipitate is formed, in order to free it from the dangerous soluble cyanide constituents. The worker must wear an apron and gloves of strong materials and also a mask to protect him from splashes.

PERFORATION OF THE NASAL SEPTUM IN CHROMIUM WORKERS. REPORT OF EIGHTEEN CASES. *F. W. Dixon. Jour. Am. Med. Assn., Sept. 14, 1929, vol. 93, pp. 837–838.*

Dixon reports eighteen cases of perforation of the cartilaginous portion of the nasal septum in men engaged in chromium plating.

Chromium plating is accomplished by immersing the object to be plated in an electrolytic vat containing, among other elements, chromic acid. In this electrodeposition, oxygen is evolved on the insoluble anode and considerable hydrogen on the cathode. These gases, rising, tend to carry into the surrounding air a fine mist or spray of chromic acid. This spray, on being inhaled, deposits the chromic acid particles inside the nose on the mucous membrane.

Chromic acid affects persons exposed by causing lesions of the skin and irritations of the nose. It affects the abraded skin, causing deep ulceration. It affects the nose in causing an inflammation of the mucous membrane with ulceration of the nasal septum, which may later lead to perforation. This final process is painless and is neither disabling nor disfiguring, but does cause inconvenience through crusting.

In plating rooms where proper ventilation of the tanks and rooms is employed, irritation is not encountered, but natural room ventilation is not sufficient.

In those already afflicted, the free application of white petrolatum to the septum caused all unpleasant symptoms to disappear. The use of mercurochrome and medicated petrolatum was not helpful. When irritations are noted, daily check-up by the nurse, coupled with regular inspection by the medical attendant, is advisable. Employees must be warned not to pick at their noses, since the chromic acid on their fingers increases the exposure. The wearing of masks and gloves, while helpful, is difficult of enforcement.—K. R. D.

NEW DATA ON SATURNISM. *E. Kohn-Abrest. Abstr. as follows from Chim. et indust., Feb., 1929, Special No., pp. 741–742, in Chem. Abstr., Sept. 10, 1929, vol. 23, p. 4281.*

A case is cited of a young man who, after working some months in a lead storage battery plant and leaving it in apparently good health, died of saturnism. Analysis of the viscera showed a total of 139.25 mg. of lead, equivalent to 19.5 parts per million. The lead contents usually found in human viscera are approximately as follows, in parts per million: lungs 2, heart 0.5, liver 2, stomach 3, intestines 1, brain 2, kidneys 2, urine 0.75, and blood 0.5. The following technic is recommended for the toxicologic determination of lead: destroy organic matter with sulphuric acid-nitric acid mixture, dilute with 2 to 3 volumes of water, boil, cool, add an equal volume of alcohol, let stand twenty-four hours, separate the precipitate first by decantation and then by alternate washing with alcohol and centrifuging, evaporate the last traces of alcohol, dissolve the precipitate in 25 per cent. ammonium acetate, pass hydrogen sulphide, let stand, centrifuge, wash repeatedly with saturated hydrogen sulphide-water mixture, dissolve in hot nitric acid, evaporate, verify the presence of lead by adding potassium iodide and identifying lead iodide, evaporate in presence of nitric acid, dissolve in ammonium acetate, and precipitate the lead as chromate. Foods generally contain only a few parts per million of lead, at the most; but some white wines have been found to contain up to 5 parts per million, while the lees can contain up to 15 to 20 parts per million.

LEAD POISONING: DIAGNOSIS AND TREATMENT OF LEAD COLIC. *E. L. Belknap. Abstr. as follows from Wisconsin Med. Jour., Aug., 1929, vol. 28, p. 346, in Jour. Am. Med. Assn., Sept. 14, 1929, vol. 93, p. 879.*

Belknap endorses the treatment of the acute stage of lead poisoning by intravenous injections of 50 c.c. of 2 per cent. calcium chloride four times daily and a high calcium diet and calcium lactate by mouth. On discharge the patient is placed on a low calcium diet and ammonium chloride further to combat the poisoning.—K. R. D.

A STUDY OF LEAD POISONING IN A STORAGE-BATTERY PLANT. *L. Greenburg, A. A. Schaye, and H. Shlionsky. U. S. Pub. Health Rep., July 12, 1929, vol. 44, pp. 1666–1698.*

This factory was engaged, chiefly, in the manufacture of storage batteries for automobile and radio use. The batteries were of the Faure type, "composed of plates made of lead grids into which has been pressed a paste composed of lead oxides." The purpose of the study was "to determine whether or not a lead-poisoning hazard existed in the plant under consideration; should such a hazard be found, to determine its exact extent; and, lastly, to propose such structural changes and remedial measures as would serve, in so far as possible, to eliminate this hazard."

Sixteen samples of atmospheric air were analyzed for lead and fifty-six workers were examined clinically. The results are given in Tables 1 and 2.

The authors believe that some of the cases of chronic lead poisoning were caused by previous lead exposures, but that the majority were due to the in-

halation of lead in this particular factory.

TABLE 1.—SUMMARY OF AIR ANALYSES FOR LEAD

ROOM	AVERAGE LEAD CONTENT OF AIR
	mg./cu. ft.
Charging room (control)	0.0000
Casting room	.0090
Pasting room	.0362
Mixing room	.0453
Assembly room (burning operation)	.0116
Assembly room (general atmosphere)	.0096

TABLE 2.—SUMMARY OF CLINICAL FINDINGS

ROOM	NO. OF MEN EXAMINED	NO. OF MEN POSITIVE FOR CHRONIC LEAD POISONING
Casting room	12	4
Pasting and mixing room	8	5
Converting room	4	4
Assembly room	10	7
Miscellaneous group	11	2
Control group (charging room)	10	1[1]

[1] Was a paster for three months and suffered from acute lead poisoning.

Concerning the effects of duration of exposure, the authors state that "lead poisoning is brought about in the assembly room in a considerably shorter time than it is in the casting room. Of the 7 men considered positive, 5 have been employed $1\frac{1}{2}$ years or less, whereas in the casting room 3 of the 4 men who are positive have been employed for periods of 8 years, 6 years, and 7 years, respectively."

The concluding paragraphs contain suggestions for improving the hygienic conditions in this plant and point out the desirability of periodic blood examinations of employees, in order to eliminate acute lead poisoning.—P. D.

MERCURY POISONING AND ITS CHEMICAL DETECTION. *Friederich and Buhr. Abstr. as follows from Süddeutsch. Apoth.- Ztg., 1928, vol. 68, pp. 702–703; Chem. Zentralbl., 1928, part 2, p. 2739, in Chem. Abstr., Oct. 10, 1929, vol. 23, p. 4639.*

In cases of mercury poisoning the chemical detection in the excreta was carried out in the following way. A chlorine current was passed in 1,000 c.c. of urine and the urine evaporated to about 150 c.c., with chlorine passing steadily through the fluid. The excess of chlorine was removed by means of carbon dioxide passed through the fluid in a slow current. Then the liquid was filtered in the cold. A few drops of copper sulphate solution (German Pharmacopeia 6) was added, the mixture was slightly acidified with hydrochloric acid and precipitated with hydrogen sulphide. The centrifugalized precipitate was suspended in water and dissolved with chlorine. Carbon dioxide was passed through, and the dilute solution was again treated with hydrogen sulphide. The precipitate formed was once more treated with chlorine and carbon dioxide as described above. The solution was filtered and finely powdered ammonium oxalate was added until the copper oxalate first precipitated dissolved again. Mercury was then precipitated by introduction of a copper wire into the blue solution. The mercury was identified as the iodide. The mercuric iodide was dissolved by passing chlorine into the aqueous suspension. The excess of chlorine was

removed and the solution electrolyzed after addition of ammonium oxalate and oxalic acid. The quantity of mercury present was calculated from the weight of the cathode. The method proved to be very exact.

METHYL CHLORIDE POISONING FROM DOMESTIC REFRIGERATORS. *A. H. Kegel, W. D. McNally, and A. S. Pope. Jour. Am. Med. Assn., Aug. 3, 1929, vol. 93, pp. 353–358.*

Kegel and his associates review the literature upon methyl chloride poisoning, including cases resulting from the manufacture, installation, or repair of commercial ice machines; summarize the symptoms, course, treatment, and pathology of the disease; and report a series of seven cases. The clinical picture is characteristic, the outstanding symptoms being drowsiness, mental confusion, coma, nausea, vomiting, and in severe cases convulsions. The temperature, pulse, and respiratory rate are all increased, and anuria usually occurs.

The blood picture is suggestive of a primary anemia with practically no regeneration during the first week. The hemoglobin falls with the red count and there is a moderate leukocytosis. The blood pressure is usually decreased. Examination of the urine indicates transient acute nephritis. The sequelae observed are suggestive of injury to nerve cells, followed by progressive degeneration.—K. R. D.

DUST HAZARDS AND THEIR EFFECTS

DUST EXPLOSION HAZARDS ENCOUNTERED BY FIREMEN IN FIGHTING FIRES IN INDUSTRIAL PLANTS. *D. J. Price. Northwestern Fire School, Univ. of Minnesota, Sept. 20, 1929, pp. 11 (mimeographed). Abstr. as follows in Chem. Abstr., Nov. 10, 1929, vol. 23, p. 5319.*

After an historical review, the danger of explosions from raising dusts during the fighting of fires is pointed out and remedies are suggested.

SOME IMMEDIATE AND REMOTE RESPONSES TO INVASION OF LIVING TISSUES BY DUST. *A. Mavrogordato. Jour. Chem., Metall. and Min. Soc. So. Africa, Aug., 1929, vol. 30, pp. 64–66.*

This very brief résumé of some of Mavrogordato's experimental studies tends to support Haldane's suggestion of diluting the present high quartz containing dust in Rand mines with an amorphous, innocuous dust like shale (see next abstract).

He makes an interesting observation on the pigmentation of the lungs of miners: "It is a familiar experience here that a man who dies of miners' phthisis many years after he has given up mining should have black lungs, and I have satisfied myself that the colouring pigment is mostly carbon. The miners' acetylene lamps provide the soot. My colleague, Dr. Strachan, has recorded the presence of iron pigment in these lungs; it is readily demonstrable but plays a minor part in the naked-eye colouration. Guinea-pigs that have inhaled silica dust and then been left in the track of a smoky chimney may retain enough carbon to colour the silica patches. This carbon is only retained in silica-stricken areas.

"If silica dust be given to an animal who has previously inhaled coal-dust

the presence of the coal does not stop the arrest of the silica. If coal-dust be given to an animal who has previously inhaled silica dust the coal does not fetch out the silica. For beneficial results the silica and 'antidote' must be inhaled simultaneously."

In conclusion Mavrogordato states: "A phthisis-producing dust must be kept out of the air as far as possible by catching it at its source of production. Good ventilation is essential.

"The exit of dust inhaled might be facilitated along the lines suggested by Dr. Haldane.

"Most lung infections are diseases of environment. Conditions must be rigidly controlled from this point of view."—P. D.

THE AVOIDANCE OF SILICOSIS WITH DRY METHODS OF WORKING. *J. S. Haldane. Jour. Chem., Metall. and Min. Soc. So. Africa, Aug., 1929, vol. 30, pp. 54–58.*

"In Rand mines silicosis has hitherto been combated by the use of sufficient water to minimise dust, and by avoidance as far as possible of the dust from blasting. By these methods great success has been obtained; and the danger from silicosis has been reduced to much less than what it once was." Haldane points out, however that "there is still a good deal of silicosis after long exposure, in spite of all the watering and all precautions."

He continues: "In other respects, moreover, the keeping of everything wet has not been an advantage. There seem to be reasons for suspecting that tubercular infection occurs more readily under wet conditions; and, though this is much less serious, the wet conditions make ankylostomiasis infection easily possible, unless rigorous precautions, difficult with natives, are enforced. But the main objection to wet methods is that at great depths the wet-bulb temperature becomes so high that only a limited rate of work is possible, and it is thus no longer practicable to work what would otherwise be quite payable ore."

The author then elaborates a suggestion he made in 1918: "I pointed out that it would apparently be possible to work by dry methods if such precautions were taken that the larger quantity of silica dust which would then be inhaled was mixed with another kind of dust possessing a property of neutralising the ill-effects of the silica. To take a well-known example, the shale dust which for the last fifteen years has been artificially applied wholesale along the roadways of British collieries, in order to prevent coal-dust explosions, contains about 35% of quartz, and nearly 60% of total silica. Before artificial stone-dusting was introduced a great deal of the dust breathed by coal miners along the roads and at the working faces was shale dust of the same character. The quartz in this dust has no tendency to produce phthisis; and the death-rates at all ages from phthisis among British coal-miners have been very exceptionally low ever since reliable statistics first became available about 70 years ago." Later Haldane explains that this neutralizing dust must be amorphous in character (like shale) and not crystalline, and should not contain a high percentage of quartz.

"Before discussing this matter further I should like to make some suggestions as to how another dust,

such as that of shale or clay, might be applied so as to protect against quartzite dust. First of all I think that shafts, inclines and open levels should, as far as practicable, be left or kept dry, and kept stone-dusted with the added dust, which could be renewed as often as necessary. Suitable apparatus for applying the dust is already available. Secondly, I think that all drills should be provided, even if water is supplied to them to expedite drilling, with efficient dust-collecting arrangements, so that the men cannot inhale the unmixed dust. Lastly, I would suggest that all blasting be so arranged that a sufficient quantity of the diluting dust goes into the air, and is scattered everywhere on surfaces around, with, or just after, each shot or round of shots. In this way stopes and drives would be kept dusted with the diluent dust, and any dust present in the air would be neutralised.

"Additional diluent dust could also, however, be applied in stopes and drives if necessary. With the dry air only a moderate air-velocity would be needed to give a satisfactory cooling effect; but good ventilation at all working places would still be essential."

There follows a discussion of the physiologic action of dusts of different kinds, with reference particularly to their crystalline quartz content and the effects of diluent dusts on otherwise silicosis producing dust.

In his concluding paragraphs and in his contribution to the animated discussion which followed the presentation of these papers, Haldane makes it perfectly clear that he understands the difficulties and dangers involved in substituting dry for wet methods in the Rand mines, even on an experimental scale. The careful co-operation of mining engineers and mine ventilation experts would be required in order to prevent dustiness from exceeding the desired limit. Haldane does not give the composition of the diluent dust but shows that present experience and the actual data available indicate clearly the probable safe diluent for Rand conditions.

These suggestions from a lesser authority on dust might be considered interesting but rather academic. Emanating as they do from Haldane and having reference to a community which has had more experience with silicosis than any other in the world, the suggestions are of particular interest and importance.—P. D.

THE PATHOLOGY OF SILICOSIS OF THE LUNG. *T. H. Belt. Canadian Pub. Health Jour., Oct., 1929, vol. 20, pp. 494–509.*

The author concludes:

Chemical determinations along with microscopic examination of human silicotic lungs tend to support the view of Gye and Kettle that crystalline silica works its ill effects in tissue by undergoing a slow chemical change into an occult (probably colloid) form.

The histopathological picture of tuberculo-silicosis suggests that under the influence of finely divided silica in "dust rests" in avascular areas of silicotic lungs, tubercle infection gains a ready foothold. These foci evidently constitute the most vulnerable quarter of the silicotic lung, and they are most numerous in those cases of silicosis which have continued to inhale silica dust after fibrosis has set in.

Histological study seems to indicate that collections of silica dust in the lung make either actual or potential lesions: if located in an adequately nourished tissue, fibrosis will progress until all the silica fragments

become invisible; if implanted in a region already containing many fibrosed lesions, a superadded local injury ensues by the action of the silica, and though further tissue reaction is not likely to occur, yet these foci, as mentioned above, provide added tubercle hazards. In theory, then, the disease must be progressive for some time after the individual leaves his dusty occupation, the progression either taking the form of increased fibrosis or of increased susceptibility to tubercle infection. The greater the fibrous response to any given dust collection, the less does that lesion favour tubercle invasion. An individual after leaving his dusty trade, having progressed to the stage of completed fibrosis, that is, a condition in which there are no remaining "silica nests" in his lung, is no longer a special tuberculosis risk.

Progression to a stage of completed fibrosis is dependent upon: (1) the period of freedom from exposure, (2) the amount of old fibrosis in the lung, (3) the ability to extrude dust fragments by outward migration of phagocytes, (4) the facility with which silica takes on its toxic properties in the individual lung, and, (5) whether or not tuberculous infection is present.

The author stresses the importance of using a polariscope in the microscopic examination of lung tissue in order to distinguish silica (quartz) from other particles.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

A Peculiar Occupational Disease. *Foreign Letter (Paris), Jour. Am. Med. Assn., Nov. 2, 1929, vol. 93, p. 1396.*

Just at present, it is the open season for hunting, and consequently there is considerable consumption of game, the selling of game being authorized only during the hunting season. There is therefore at present much game imported; more particularly, quail, hundreds of thousands of these birds being taken when they alight on the sandy beaches of Egypt, exhausted by their long migratory passage across the Mediterranean. They are easily captured with a net, and they are shipped in crates, chiefly to the market halls of Paris. But they are at present lean, and they are fattened rapidly in order to have them in good condition for eating. To accomplish this, recourse is had to the stuffing process. But while that is easy to do with poultry, owing to the fact that the beak is large enough to permit a tube being slipped down the esophagus, through which food is passed by force, it is not so easy in dealing with quail, owing to the smallness of the beak. Therefore, another procedure is adopted. In the cellars of the market halls of Paris may be found some fifteen professional *gaveurs*, or bird stuffers (Italians or Poles, usually), who masticate grains and fruit and make a sort of pap of it, which is fed to the quail. The operation is carried on every day for two or three weeks, each bird being considered separately and not sold until it has attained a certain weight. But it has recently been discovered that this industry presents a real danger. Most of these bird stuffers are from time to time pecked on the mouth by the birds, which often leads, in the course of two years, to the development of phagedenic ulcers on the lips, which degenerate into horrible mutilations, apparently the result of an aspergillosis or an actinomycosis. The transmission of diseases by the

beak of birds is not without precedent. A number of years ago, attention was called to a very grave type of pulmonary disorder, psittacosis, caused by small parrots of the Antilles in persons who allowed these birds to take food from their mouths, and this disorder was not only often fatal but was sometimes communicated to their entourage.—K. R. D.

SPINAL ARTHRITIS: AN INDUSTRIAL HAZARD. *L. W. Allard. Jour. Am. Med. Assn., Nov. 16, 1929, vol. 93, pp. 1556–1557.*

Spinal arthritis in its various types is a common affliction of adults, especially laborers, and may exist extensively without symptoms. In its incipience, symptomatic arthritis is without roentgen evidence. The discomforts and disabilities from spinal arthritis in industrial injuries are largely due to disturbance of the partially fused joints.

Arthritic subjects are prone to disability of greater or less duration from injuries that would not affect a normal person; and disabilities complicated by arthritis occasion a longer convalescence than disabilities occurring in normal spines. The victim of arthritis is not a normal man. His efficiency is lowered. He is awkward, often distracted by his discomfort, easily fatigued, and an easy prey to minor accidents; in short, an industrial hazard. Patients with recognized arthritis, properly advised, however, may be preserved for years of usefulness, with a big saving to industrial insurance.—K. R. D.

HEAT, COLD, AND HUMIDITY

THERMAL EXCHANGES BETWEEN THE HUMAN BODY AND ITS ATMOSPHERIC ENVIRONMENT. *F. C. Houghten, W. W. Teague, W. E. Miller, and W. P. Yant. Am. Jour. Physiol., April, 1929, vol. 88, pp. 386–406.*

The important conclusions to be drawn from this study dealing with exchanges of heat and moisture in persons engaged in sedentary occupations during exposure to various temperatures, humidities, and air velocities may be summarized as follows:

1. The rates of heat production and heat loss are functions of the effective temperature index, regardless of changes in dry bulb temperature, wet bulb temperature, and air movement, when other factors remain constant.

2. The zone of minimum metabolic rate lies between 19.3 and 28.7°C., effective temperature. Within these limits, metabolism reaches a fairly constant rate of about 53.4 calories per hour per square meter of body surface. The metabolic rate increases for temperatures above and below this zone.

3. With certain limitations, heat loss by evaporation alone and heat loss by combined radiation and convection appear to be functions of the dry bulb temperature. The former increases with temperature and the latter decreases when temperature increases.

4. When the dew point temperature of the air approaches the surface tem-

perature of the body, the relationship in item 3 ceases to hold, since no evaporation is then possible.

In criticism of this excellent study, it may be said that the graphs are poorly shown and the text itself sometimes lacks clearness.—C. P. Y.

EFFECT OF HIGH EXTERNAL TEMPERATURE ON CIRCULATION IN MAN. *M. Marschak. Abstr. as follows from Ztschr. f. d. ges. exper. Med., May 29, 1929, vol. 65, p. 655, in Jour. Am. Med. Assn., Sept. 14, 1929, vol. 93, p. 886.*

Marschak determined the minute-volume of the output of the heart in each of three students, aged from 25 to 30, during rest and at various external temperatures (64.5° F., 68°F., 86°F., 95°F., and 115°F.) and 50 per cent. relative humidity. He found that a high external temperature, unless continued over a long period of time, does not cause an increase in the minute-volume. At an external temperature of 115°F. and 50 per cent. relative humidity, only a slight increase in the minute-volume was noted after one hour. The author believes that the constant value of the minute-volume output of the heart at high external temperatures, at which an increased flow of blood through the skin always occurs, confirms the theory that under these conditions the internal organs function with a greatly decreased amount of blood.—K. R. D.

HEAT INJURIES AMONG NATIVE MINERS IN THE WITWATERSRAND GOLD MINES. *A. J. Orenstein. Jour. Chem., Metall. and Min. Soc. So. Africa, Aug., 1929, vol. 30, pp. 66–69.*

This brief summary of the experimental work carried out by Orenstein and Ireland since 1920 deals with the effect of temperature conditions on the working efficiency of natives employed in the Rand mines, and with the twelve cases of heat stroke which occurred, for the most part, among newly employed workers a few days after beginning their employment.—C. P. Y.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

DUST AND GERM CONTENT OF AIR IN SCHOOLS. *M. Grünewald. Abstr. as follows from Haustechn. Rundschau, vol. 32, p. 241; Wasser u. Abwasser, vol. 25, p. 95, in Chem. Abstr., Nov. 20, 1929, vol. 23, p. 5529.*

The influence of ozonization upon the dust and germ content was studied.—P. D.

A STUDY OF RURAL SCHOOL VENTILATION. THE SCHOOL VENTILATION STUDY IN CATTARAUGUS COUNTY, N. Y., 1926–27. *T. J. Duffield. U. S. Pub. Health Rep., Oct. 4, 1929, vol. 44, pp. 2383–2410.*

"The school ventilation study in Cattaraugus County, N. Y., is one of the three field studies undertaken by the New York Commission on Ventilation following its reorganization in 1926. . . .

"The primary object of the study was to determine just what were the air conditions in one and two room rural schools, with the secondary purpose of learning, if possible, how these air conditions affected the health of the pupils."

The fundamental observation, in attempting to judge air conditions, was that of temperature. Readings were taken eight times daily at a point selected as representative of the average conditions in the room. These records, which were kept by the teacher, were supplemented by data collected by the Commission's observers on regular trips to forty-five of the forty-eight classrooms every ten days or two weeks. The data include: temperature distribution, horizontal and vertical, and relative humidity.

"To satisfy the second question, a record was kept of the attendance and health records of the pupils. . . . The teacher was requested to record the occurrence of respiratory illnesses (colds or sore throats) among the pupils, both present and absent, in addition to giving an abstract of the attendance register. For the absentees, the cause of absence as stated in the excuses sent by the parents was accepted, while the teacher was asked to use her own judgment in recording colds and sore throats among the pupils present."

In Cattaraugus County (1,200 square miles), there are 234 grade schools having but one room and thirteen having two rooms. It has been estimated that in the state as a whole, there are more than 8,000 schools of this type, with an average registration of more than 150,000 pupils.

In conclusion, the author states: "In general, one and two room rural schools, such as those observed in Cattaraugus County, appear to be highly unsatisfactory from the standpoint of heating and ventilation. They are subject to gross overheating on the one hand and to serious chilling on the other, and show wide horizontal and vertical differences in the temperatures existing simultaneously in different parts of the same room. . . .

"In general, the prevalence of respiratory illness showed an inverse relationship to outdoor temperatures, that is, the incidence of respiratory illness was greater during the cold months of the year. In the absence of other factors, however, low temperature itself did not appear to be directly associated with increased respiratory illness.

"During periods of low temperature, deviations from the general trend of the incidence of respiratory illness varied with the fluctuations in precipitation, the maximum effect occurring in the week following that which had an excess of precipitation, with the exception of the last week of the study."

The author makes clear the difficulties involved in such a study and is not too positive in his conclusions. The reviewer would certainly hesitate to name the average or significant temperature in a room where two readings were 40°F. apart.

Our English friends, who are interested in the various Anglo-American ventilation disputes, should enjoy some of the astonishing figures in this report.—P. D.

SOME POINTS OF INTEREST IN

SCHOOL VENTILATION. *F. M. R. Bulmer. Canadian Pub. Health Jour., Oct., 1929, vol. 20, pp. 479–483.*

DEEP MINE VENTILATION. *J. S. Haldane. Jour. Chem., Metall. and Min. Soc. So. Africa, Aug., 1929, vol. 30, pp. 51–54.*

From his wealth of experience with mine conditions, Haldane gives a very clear picture of the economic advantages which would accrue as a result of substituting dry for wet mining methods in the Rand mines. In addition to increased comfort and working efficiency, this substitution would probably reduce tuberculous infection and abolish the risk of ankylostomiasis.

A clearer or more concise statement of the essential physiology of temperature and humidity in relation to acclimatization and working efficiency would be hard to find.—P. D.

THE ENGINEERING ASPECT OF DEALING WITH TEMPERATURE AND HUMIDITY CONDITIONS OF MINE ATMOSPHERES AT THE GREAT DEPTHS ASSOCIATED WITH SOME OF THE GOLD MINES OF THE WITWATERSRAND. *J. H. Dobson. Jour. Chem., Metall. and Min. Soc. So. Africa, Aug., 1929, vol. 30, pp. 58–62.*

In the deep level workings of the gold mines of the Witwatersrand, a serious ventilation problem is caused by the rise in temperature and humidity of the ventilating current as it descends. The temperature and humidity conditions underground are the same the year around, regardless of the temperature and humidity of the air entering at the surface of the mine.

The author discusses various methods for cooling and dehumidifying the air in deep mines, but states that a necessary preliminary to the application of any method is the adoption of some means to prevent absorption of moisture by the ventilating current in its downward path. Otherwise, as the operations are continued to deeper levels, the cost of cooling and ventilation will be so high in these mines as to approach the value of the gold mined.—C. P. Y.

KATA-THERMOMETRIC AND OTHER INVESTIGATIONS OF HYGIENIC CONDITIONS ON BOARD A COAL BURNING STEAMER CIRCLING AFRICA. *L. Schwarz. Arch. f. Hyg., 1929, vol. 101, no. 3, pp. 173–194.*

According to the indications of the kata-thermometer, hygienic conditions in engine and stoking rooms of vessels in tropical regions are not satisfactory, even in first-class vessels. It is stated that these conditions are sometimes worse than those which prevail on the shores of Africa.

The author recommends the use of electric fans whenever the velocity or direction of the wind is unfavorable. Escape of steam into the workrooms should be prevented and all hot surfaces should be covered with insulation.

It is suggested that natives of warm countries, such as the Chinese, might be better suited to the work of stokers and trimmers on board vessels in tropical regions than are Europeans.—W. K.

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INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

A Study of Personal Qualities in Accident Proneness and Proficiency. *E. Farmer and E. G. Chambers. Indust. Health Res. Board, Rep. No. 55, pp. 80. H. M. Stationery Office, 1929.*

Knowledge regarding the causation of accidents and means for their prevention has greatly changed in recent years. Study of the statistics of industrial accidents has revealed that a large number, over 80 per cent., are not associated with moving machinery at all, but result from circumstances entirely under the control of the workers; and that one-fourth of all accidents result either from bodies falling upon persons or from persons falling themselves. Even among the accidents caused by machinery the personal factor enters largely, as a consideration of accidents caused by automobiles makes manifest.

Study of accident records has also shown that they are not just providential occurrences distributed according to the laws of chance; on the contrary a small group of workers are always found monopolizing an undue proportion of the accidents. Careful investigation has revealed that this small group starts with an innate tendency to sustain accidents, a tendency which is so definite that if the number of accidents sustained is known for the past, then an accurate estimate can be made of the number that will be sustained in the future. This group is also found to experience an undue amount of lost time for sickness, and to contain the poorest workers. On the other hand the best workers are found to suffer least sickness and experience fewest accidents. Another investigation has shown that there is an optimum temperature, about 67.5°F., at which fewest accidents occur, and that if the temperature rises or falls, the incidence of accidents increases.

The present report tells of an effort to carry investigations further by attempting to pick out those workers who are naturally predisposed to accidents. A number of tests which are carefully described were applied to 1,800 apprentices in the workshops of certain Naval and Royal Air Force establishments, regarding whom information was available concerning the results of their entrance examinations and also concerning their subsequent occupational history. Tests were devised to disclose intelligence, muscular power, visual acuity, and aesthetokinetic capacity. The way in which these tests correlated one with another and with other facts known about the apprentices is set out in detail. The important fact emerges that the group of aesthetokinetic tests selected an interesting small group. These tests included a dotting test in which the subject had to dot a series of small circles passing before him at increasing speed; a pursuit meter test in which the irregular movements of a mechanically controlled pointer had to be followed; and a choice reaction test wherein response had to be given to visual, auditory, and tactual stimuli. A group of apprentices comprising 25 per cent. of the whole, who did worst at this set of tests, were found to experience twice as many accidents as

the remaining 75 per cent. On the other hand, those who did well at these tests tended to be more proficient in the dockyard occupations; hence use of these tests for selecting apprentices would help to reject a small number with a high accident rate and to select a large number who would be more industrially proficient.

The authors do not consider that their investigation has by any means reached its final stage; but they have undoubtedly shown the way toward reducing the incidence of accidents in industry and toward increasing proficiency.—E. L. C.

FURTHER EXPERIMENTS ON THE USE OF SPECIAL SPECTACLES IN VERY FINE PROCESSES. *H. C. Weston and S. Adams. Indust. Health Res. Board, Rep. No. 57, pp. 27. H. M. Stationery Office, 1929.*

In many processes calling for close vision the best of illumination does not relieve strain on the muscles of convergence and accommodation. For this purpose special spectacles to relieve the eyestrain may be worn with advantage by persons with normal vision; while persons with errors of refraction find still greater advantage from their use. This report contains the observations made on different workers while: (1) examining steel balls, (2) burling and mending woolen cloth, (3) linking hosiery, and (4) chevening, or embroidering designs or clocks on hosiery.

Each of these processes, particularly the examination of steel balls, calls for close vision. At the mending process, only the most difficult work of sewing in new threads was measured. When the special spectacles were worn, the average improvement of those with normal vision and those with errors of refraction was respectively 26.7 and 28.4 per cent. for ball examiners, 21.9 and 12.3 per cent. for cloth mending, 2.1 and 5.9 per cent. for linkers, and 1.3 and 4.9 per cent. for cheveners.

A description is given of the way in which spectacles for fine work should be prescribed and used. In most cases oval lenses having a horizontal axis of 37.5 mm. and a vertical axis of 30 mm., flattened at the top so that the actual vertical measurement is 23 mm., will be found suitable. The comfort of the glasses and the absence of unpleasant sensations, as of "drawing" of the eyes, depends largely on the combination of suitable prisms with the spherical lenses used. Such spectacles would cost about 15 shillings; but their cost is soon regained from the extra amount of wages earned by their wearers.

This research is of considerable interest, since it points out how the human eye, which is not well fitted for close industrial work, can be aided. The principle is the same as that adopted when labor-saving devices for easing effort are provided for other parts of the human machine.—E. L. C.

PSYCHOLOGIST TAKES A HAND IN PERSONNEL SELECTION. *W. F. Persons. Abstr. as follows from Aera, Aug., 1929, vol. 20, pp. 462–467, in Personnel Jour., Dec., 1929, vol. 8, p. 291.*

The article is a description of the psychologic tests employed in the Milwaukee Electric Light and Power Company.

Following a well-planned personality

interview, the prospective operator is subjected to a series of psychologic tests and his reactions are automatically recorded on a mechanism designed for the purpose. In this manner candidates who are inherently unqualified for service are eliminated before training reaches the platform period.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

ENACTMENT OF FACTORY REGULATIONS. *Foreign Letter (Japan), Jour. Am. Med. Assn., Oct. 5, 1929, vol. 93, p. 1078.*

Factory regulations that abolish night work for women and children have now been in force in Japan since July. This matter was first considered in 1916, and it was agreed in 1923 that the managers of factories should not make women, or children below 16 years of age, work more than eleven hours a day or between 10 P. M. and 4 A. M. The enactment of the regulations, however, was postponed until this year. The regulations will affect 4,824,780 laborers (3,291,168 males and 1,533,612 females) who are working in factories and mines. The factory workers total 2,224,545, of whom 1,792,857 are males.

Mrs. Yayoi Yashioka, head of the Girls' Medical College, has published her investigations concerning the health and night work of women workers in various factories, as follows: (1) The average decrease in weight of eighty-one female workers in a cotton mill was 647.5 gm. after a week of night work, of which only 318.75 gm. was regained during their alternating week of day work. Thus there was an average deficit of 328.75 gm. (2) In a printing house, the average decrease in weight of 204 workers was 970 gm., while the average increase during the alternating week was only 236.25 gm., leaving an average deficit of 733.75 gm. (3) In a confectionery, the average decrease in weight of twelve workers was 251.25 gm., in contrast to an average increase of 183.75 gm. during the alternating week, leaving an average deficit of 67.5 gm. (4) In an iron works, the average decrease in weight of 211 workers was 1,192.5 gm. and the average increase was only 802.5 gm., leaving an average deficit of 390 gm.—K. R. D.

PSYCHOGENIC FACTORS AND PRECIPITATION POINT IN THE POST-TRAUMATIC NEUROSES. *W. F. Schaller and M. R. Somers. Jour. Am. Med. Assn., Sept. 28, 1929, vol. 93, pp. 967–971.*

Schaller and Somers outline a form of procedure which they have found useful in examinations of the posttraumatic neuroses. The establishment of a posttraumatic neurosis may be identified by a precipitation point which develops at a comparatively early period in the course of the neurosis, and which may be identified by a point of negative departure of efficiency, by a climax of adverse mental influences occurring after meditation, and by the usual symptoms and signs of a psychoneurosis. At the precipitation point, the complication of a psychoneurosis enters as a new

factor of industrial disability and compensation.

A posttraumatic neurosis, when established, runs a relatively long course, and is resistant to the ordinary forms of medical treatment.—K. R. D.

INDUSTRIAL TUBERCULOSIS. *S. J. Shipman. Jour. Am. Med. Assn., July 27, 1929, vol. 93, pp. 257–259.*

In general, tuberculosis or its activation should be regarded as the result of an industrial accident when:

1. Pulmonary tuberculosis develops within a reasonable length of time in a previously healthy individual, following trauma to the chest, sufficient to cause functional impairment. Fractured ribs or clavicle or severe contusions should be considered prima facie evidence of such an injury. In cases of this type tuberculosis should develop at the site of the injury; for example, in injuries to the left side of the chest tuberculosis should develop in the left lung, unless the factors operative are those given under 3 or 4.

2. As a result of trauma to the chest, as described under 1, a previously proved or assumed inactive tuberculosis is reactivated. In this case the liability of the carrier should cease with the arrest of the process.

3. As a result of trauma, impairment of the general health (resistance) occurs, as manifested chiefly by loss in weight; tuberculosis develops or is reactivated before such impairment has ceased.

4. As a result of industrial disease, or diseases directly related to injuries (pneumonia, pneumonokoniosis, and the like), tuberculosis develops or is reactivated preceding recovery from such a disease or its effects.

5. In a previously healthy bone or joint or other organ, tuberculosis develops at the site of the injury at any time before functional and anatomic restoration of the bone or joint or other organ has taken place, or within a reasonable time after the maximum recovery from such an injury.

6. Hemoptysis occurs from a lesion which has the appearance of an old lesion and when the history and other evidence indicate that no functional impairment existed previous to the hemoptysis, provided such hemoptysis follows trauma. Hemoptysis occurring during the usual occupational routine, whether this involves light or heavy work, should not be considered industrial.

7. Spontaneous pneumothorax, presumed to be of tuberculous origin, follows directly on unusual exertion or injury.—K. R. D.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

SICKNESS AMONG INDUSTRIAL EMPLOYEES. FREQUENCY OF DISABILITY LASTING LONGER THAN ONE WEEK FROM IMPORTANT CAUSES AMONG 163,000 PERSONS IN INDUSTRY IN 1928, AND A SUMMARY OF THE MORBIDITY EXPERIENCE FROM 1920 TO 1928. *D. K. Brundage. U. S. Pub. Health Rep., Jan. 17, 1930, vol. 45, pp. 107–116.*

1. Reports from a group of about thirty-five industrial sick benefit associations and company relief departments showed that cases of sickness

and nonindustrial injuries causing disability for eight consecutive calendar days or longer occurred at the rate of 103.5 cases annually per 1,000 men during the period 1921 to 1928, inclusive. This figure may understate to some extent the real incidence of disability lasting longer than one week, because sick benefits are usually denied for certain diseases and for illness of any kind under certain circumstances.

2. Respiratory diseases were reported as the cause of 42.4 per cent. of the cases; digestive diseases, 13.5 per cent.; and external causes (nonindustrial accidents), 9.8 per cent. These three groups, accordingly, accounted for nearly 66 per cent. of the cases for which sick benefits were paid by associations reporting to the United States Public Health Service.

3. In the respiratory group influenza or grip continues to be of outstanding importance, accounting for 57.5 per cent. of the respiratory cases in 1928, compared with 50 per cent. during the period 1921 to 1928.

4. The frequency of disability on account of respiratory tuberculosis was lower in 1928 than in any of the preceding years of record.

5. Five of the nine years covered by the record were marked by influenza epidemics. In the other four years the winter incidence of influenza or grip was of no inconsiderable magnitude.

6. Relatively low sickness rates were found among men employed in the iron and steel industry. An exception was the rate for pneumonia, which appears to be about 50 per cent. higher than among other industrial employees as a whole. Data for a study of the incidence of pneumonia by occupation in the steel industry have been collected and are being analyzed.—*Author's Summary.*

CASUALTIES IN METAL MINING INDUSTRY REDUCED. *Jour. Am. Med. Assn., Nov. 23, 1929, vol. 93, p. 1659.*

The United States Bureau of Mines reports a reduction of 19 per cent. in the death rate in the metal mining industry during 1928 and a reduction of 7 per cent. in the rate for injuries. There were 273 miners killed and 22,483 injured in the metal and nonmetallic mineral mines of the country during 1928 in a total of 113,866 men employed. The highest fatality rate (3.03 per thousand 300-day workers) was in the copper mining industry. Of the total number of workers, 70,188 were employed underground, and among these 227 were killed, while among 29,378 employed on the surface, thirty-one met death, and of 14,300 employed in open pits fifteen were fatally injured. The greatest single cause of death to underground workers was falling rock or ore from roof or wall. Shaft accidents caused forty-one deaths. The greatest number of workers employed in the metal mining industry of any state was 15,329 in the copper and iron mines of Michigan.—K. R. D.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

LA MÉDECINE DU TRAVAIL (INDUSTRIAL MEDICINE).

The first number of this journal appeared in October, 1929. It is to be devoted to occupational pathology and physiology, to industrial accidents and occupational diseases, with a leaning toward their social aspects. It is edited by Professor E. Martin with a committee of collaboration. It is published by the Faculty of Medicine of the University of Lyons and is essentially a French journal. The editor states the objects which it is hoped will be served, particularly in bringing together employers, workmen, and the medical profession. Scientific investigations will be carried out and knowledge will be made known which may be expected to prevent the occurrence of occupational diseases rather than attempt to cure them or compensate them after occurrence.

This first number contains an introduction by A. Thomas, the head of the International Labour Office of Geneva, who describes the ground gained since his office came into existence in 1919—the international agreements arrived at for protecting the health of workers, particularly of women and children, and the action taken to prohibit the

use in industry of yellow phosphorus and to limit the use of lead and its compounds. It is followed by an article by L. Devoto of Milan, who deals with compulsory insurance against occupational diseases in Italy. At present this has only been extended to poisoning by lead, mercury, phosphorus, carbon bisulphide, benzine and its homologues, the nitro derivatives of benzene, and ankylostomiasis. Anthrax is looked upon as an industrial accident and so is pulmonary anthracosis. This list can at any time be changed and enlarged by decree. In addition to these articles the number includes abstracts of certain books and current literature.

A feature of the early numbers is to be a part which can be separated containing the proceedings of the Fourth International Congress on Occupational Diseases which took place at Lyons in April, 1929. The first contribution toward these proceedings deals with the order of the day and general matters. The first matter considered was the important question of silicosis which occupied the first day; it was followed by the consideration of occupational cataract and then of occupational poisonings. Separate communications will be noted elsewhere in our pages.—E. L. C.

CENTRAL REPORT OF THE LABOR INSPECTORATE OF THE KINGDOM OF THE NETHERLANDS FOR 1928.

A special section of this report (Chapter 9) is devoted to matters arising out of medical inspection during the year. It deals with such occupational diseases as anthrax, the absorption of aniline, carbon dioxide, nitro derivatives of benzene, nystagmus, and diseases due to the inhalation of dust. An account is given of certain special inquiries. One related to an examination of workers in the aniline industry; another to skin diseases found among workers in the bulb trade, where irritation appears to arise from crystals of calcium oxalate originating from bulbs of hyacinths and tulips; and a third to an inquiry into the effect of high temperatures experienced at brickworks. The report contains several useful illustrations, one of which shows a condition known as "road maker's hand" (*Straatmakershand*), which affects the right hand of these men in consequence of their work.—E. L. C.

PROPHYLAXIS AND THERAPY OF OCCUPATIONAL DISEASE. *Michaelis. Abstr. from Fortschr. d. Med., Aug. 9, 1929, vol. 47, p. 605, in Arch. Neurol. and Psychiat., March, 1930, vol. 23, p. 570.*

Many hygienic measures should be insisted on in industrial plants for prophylaxis against occupational disease. Illumination and ventilation in the workrooms, special rooms for eating, the use of rest periods, rooms for dressing and undressing, clean toilets and washrooms are indispensable. No employee should be permitted to eat without careful washing of hands and finger nails. Ventilation for the removal of poisonous gases or of dust, and protection from dangerous machinery, especially for women and children, are usually made obligatory by law. Death from gas poisoning should not be acknowledged until rigidity develops, and artificial respiration should be undertaken for hours by the manual method. . . . . In all factories medica-

ments and surgical equipment should be ready for any emergency, such as saline infusion, tracheotomy sets, gastric lavage, etc. The various antidotes for alkali, acid, aniline, arsenic, lead, and other poisoning are reviewed in detail.

Opera Collecta. Fifth International Medical Congress on Industrial Accidents and Occupational Diseases, September, 1928. *Budapest, 1929.*

Illness Due to Sulphur Chlorides. *J. Adler. Pp. 405–410.*—A case is quoted of a worker at a rubber factory who suffered illness at his work. In order to investigate the subject, mice and rats were experimented with, and the results upon the liver, nerves, lungs, brain, and spinal cord are reported.

Observations on Occupational Lead Poisoning in the Industrial Department of the Kaiserin Auguste Viktoria Hospital at Berlin-Lichtenberg. *E. W. Baader. Pp. 411–416.*

Measures and Provisions (Institutions) for the Care and Compensation of Industrial Accidents and Occupational Diseases in Hungary. *J. Barla-Szabó. Pp. 417–425.*

The Volunteer Ambulance Corps of the Red Cross in Public Health Affairs, with Special Reference to the Care of Accident Cases. *Betke. Pp. 425–434.*

Experiences with Occupational Diseases, with Special Reference to Lead Poisoning. *Betke. Pp. 434–437.*

New Sources of Mercury Poisoning. *J. Bodnár. Pp. 437–440.*

Symptoms of Lead Poisoning. *W. v. Friedrich. Pp. 440–442.*

A Large Group of Silicotics with Very Low Incidence of Tuberculosis. *E. R. Hayhurst. Pp. 450–460.*—This paper is another edition of the one which has already appeared in This Journal (1929, vol. 11, Article Section p. 228).

Diagnosis of Pneumonokoniosis. *L. Holst. Pp. 460–464.*

New Observations on Noise and Deafness. *Holtzmann. Pp. 464–465.*

The Organisation for the Treatment of Accidents and Diseases among Workers in Certain of the Rand Mines, South Africa. *A. J. Orenstein. Pp. 475–483.*—A description is given of the medical services for natives working at a group of fourteen gold mines which employ an aggregate of 85,000 natives and 10,000 Europeans. This service includes free medical treatment for diseases and accidents and the provision of hospital accommodation. Wounds are washed at ambulance rooms in running water, sprayed with tincture of iodine, and then with iodized liquid paraffin, after which a sterilized dressing is applied. Excellent results follow. The equipment provided, in the form of splints, tourniquets, bandages and dressings, and also blankets and a stretcher, is given in detail.

The natives are particularly prone to pneumonia and tuberculosis; there were 3,272 cases of pneumonia in one year, with a case mortality of 12.3 per cent. There were also 529 cases of pulmonary tuberculosis, with a case mortality of 11.7 per cent. Natives tend to suffer from vitamin deficiency, and a diet containing a maximum of antiscorbutic vitamin has to be provided. (Each native is inspected at intervals of not more than six weeks. If his weight has fallen more than 5

pounds he is referred to a medical officer.)

European miners have to belong to Friendly Societies, through which their medical services are organized. The whole health organization of the group of mines dealt with is controlled by one department.

Experiences with Industrial Diseases. *Quensel. Pp. 485–492.*

The Rôle of Hypersensitiveness in the Production of Occupational Diseases of the Skin. *E. Rajka. Pp. 492–495.*

The Influence of Industrial Occupations on Heart Disease. *J. Rohrböck. Pp. 495–499.*

Physiological Response Attending Exposure to Vapors of Methyl and Ethyl Chlorides, and Bromides. *R. R. Sayers and W. P. Yant. Pp. 500–505.* —This is a summary of the material reported in United States Public Health Bulletin No. 185, which was abstracted in THIS JOURNAL, 1929, vol. 11, p. 182.

The Cause of Brassfounders' Fever. *L. Schmidt-Kehl. Pp. 505–506.*

Workers' Welfare, Protective, and Sanitary Provisions in the Tatabányaer (Totis) Mines. *I. Szabó. Pp. 506–510.*

Observations on Cancer in Briquette Workers. *W. Teutschlaender. Pp. 510–516.*—This article gives some account of the occurrence of warts among briquette workers and also of skin cancer, which came under the attention of the author.

Ankylostomiasis as an Occupational Disease. *J. T. Fraguas. Pp. 516–520.*—Information is given as to the distribution of ankylostomiasis in mines in Spain, which are, for the most part, metalliferous mines. In Spain the problem is not confined to miners but also concerns agricultural workers. Nevertheless, it is definitely an occupational illness which can be cured easily and rapidly. For this purpose, however, suitable prophylactic and hygienic measures should be rigorously enforced; such action would be stimulated by granting compensation for the disease, which is as much an occupational trouble as is anthrax or poisoning by lead or mercury.

Value of Statistics in Industrial Hygiene. *W. Weisbach. Pp. 520–526.*

Industrial Poisoning through Inhalation and its Prevention. *I. K. Wollin. Pp. 527–530.*

Our Cases of Lead Poisoning. *S. Záborszky. Pp. 530–532.*

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

CHRONIC BENZENE POISONING IMPROVED BY LIVER. *A. R. Smith. Jour. Am. Med. Assn., Dec. 21, 1929, vol. 93, pp. 1970–1971.*

Dr. Smith reports a case of chronic benzene poisoning in which definite improvement followed the ingestion of whole liver, although three transfusions, previous to the liver therapy, had not brought about any improvement in the blood picture. The chief effect of the liver diet was apparently on white rather than on red cell production. The reticulocyte response, though present to a slight degree, was not similar to that found in pernicious anemia.—K. R. D.

EXPERIMENTAL STUDY OF INDUSTRIAL CARBON DIOXIDE POISONING. *R. Schultzik. Arch. f. Hyg., Dec., 1929, vol. 102, pp. 366–390.*

1. Animal Experiments: Laboratory animals are considerably more resistant to carbon dioxide than are human beings. They should not, therefore, be used for determining dangerous amounts of the gas.

2. Human Experiments: The conjunctiva is sensitive to even small amounts of carbon dioxide and is almost a more delicate indicator of the presence of the gas than is the candle test.

3. Exposure to from 60 to 80 per cent. of carbon dioxide for as long as one hour does not produce any symptoms of poisoning in a subject wearing a well-fitting oxygen apparatus. Absorption through the skin cannot, therefore, be important.

4. Author's Experiments on Himself, without Oxygen Apparatus: Exposure for fifty minutes to 5 per cent. of carbon dioxide produced no special signs of carbon dioxide poisoning. During exposure to from 9 to 9.5 per cent. of carbon dioxide, the symptoms of poisoning assumed a menacing degree.—*Author's Summary.*

COMPARISON OF PATHOLOGIC EFFECTS OF PROLONGED EXPOSURE TO CARBON MONOXIDE WITH THOSE PRODUCED BY LOW OXYGEN PRESSURE. *J. A. Campbell. Abstr. as follows from Brit. Jour. Exper. Path., Oct., 1929, vol. 10, p. 304, in Jour. Am. Med. Assn., Nov. 30, 1929, vol. 93, p. 1766.*

It is shown by Campbell that in chronic carbon monoxide poisoning in animals the pathologic effects resemble closely those of prolonged exposure to low oxygen pressure in the inspired air; the main changes are venous congestion with atrophy of certain cells (*e.g.*, liver, heart muscle near the epicardium), edema and dropsy indicating that heart failure is the cause of inability to tolerate prolonged exposure to carbon monoxide. The organs showing most marked congestion and its sequelae are the liver, lungs, heart muscle near the epicardium, and the brain. Haldane's view that carbon monoxide acts purely by interfering with the oxygen supply to the tissues is supported. Power to tolerate carbon monoxide—just as in the case of low oxygen pressure in the air—depends on the ability of the vital organs, particularly the heart, to continue to function under a low tissue oxygen tension; the tissue oxygen tension is not brought back to the normal level by so-called acclimatization under severe degrees of oxygen want.—K. R. D.

THE OCCURRENCE OF LEAD IN THE EGG OF THE DOMESTIC HEN: AN ADDITIONAL NOTE. *W. B. S. Bishop and T. Cooksey. Med. Jour. Australia, Nov. 9, 1929, vol. 2, pp. 660–662.*

Articles reporting upon Parts I, II, and III of this extended research appeared on April 21, 1928, Jan. 26, 1929, and June 15, 1929. (See THIS JOUR., 1928, vol. 10, Abstr. Section, pp. 216–217; 1929, vol. 11, Abstr. Section, p. 158, and p. 244.) This report deals with work undertaken in reply to criticism of results previously announced. The original method used for determining the presence of lead was checked by employing Ivanov's reaction with potassium metabisulphite as a precipitant, and was shown to give accurate

and repeatable results. On analysis, the silica basins used were found to be negligible as a source of lead contamination. The conclusion which was previously announced, that lead is present in eggs in minute but appreciable amounts, is held to be confirmed. The amounts found in three batches of eggs were, per egg, 0.075, 0.052, and 0.114 mg. of lead.—E. L. C.

PATHOGENESIS, CLINICAL ASPECTS, AND TREATMENT OF LEAD POISONING. *S. Litzner. Abstr. as follows from Med. Klin., Sept. 20, 1929, vol. 25, p. 1462, in Jour. Am. Med. Assn., Nov. 23, 1929, vol. 93, p. 1690.*

Litzner asserts that lead is the cause of the majority of industrial diseases. The lead is absorbed by the skin, the gastro-intestinal tract, and the respiratory organs. The quantity that is absorbed by the skin is so small that it may be disregarded. The largest amounts are absorbed in the upper portions of the small intestine. Investigations on the distribution of the lead in the organism and on the various modes of excretion showed that the vascular system, liver, kidney, and intestine are affected first in lead poisoning. The author further discusses the clinical aspects of this condition. The injurious effects on the vessels are either of a functional or of an organic nature. The coloring of the skin in lead poisoning is due to a contraction of the cutaneous vessels. Lead amaurosis is a result of vascular spasms in the eye or in the brain. The increased blood pressure in lead colic is due to generalized vascular spasm. Other forms of lead poisoning are arthralgia saturnina, gangrene of the lower extremities, and lead encephalopathy. The disturbances of the liver, kidney, and intestinal tract that are caused by lead are likewise discussed. Concerning the treatment of acute lead poisoning, the author states that the first object should be to remove the lead from the circulating blood. Since it is not possible to eliminate all the lead, its deposition in the bones should be stimulated. In order to effect this, the patient should receive large quantities of milk and calcium. The diet should be alkaline and should provide green vegetables, fruits, and eggs. Medicaments that effect the elimination of lead, such as potassium iodide, are contraindicated because they counteract the reduction of the lead content in the blood. Only after the acute symptoms have disappeared should attempts be made to remove the lead from the body. Instead of an alkaline diet the patient should now receive a sour diet containing large quantities of meat, liver, and potatoes; also tea and coffee. For medication the author recommends any one of the following drugs: a solution of phosphoric acid, ammonium chloride, or potassium iodide.

CONCERNING INCREASED BLOOD PRESSURE IN CHRONIC LEAD POISONING. *Schnitter. Abstr. as follows from München. med. Wchnschr., 1929, vol. 76, pp. 151–152, in Bull. Hyg., Dec., 1929, vol. 4, p. 985.*

Schnitter disputes the usually accepted view that blood pressure is increased in lead poisoning. As the mean of 100 cases Goadby found it to be 150 mm. Hg—the highest 178 and the lowest 115; Collis, 148.2 as the average in 131 lead smelters and 146.5 among thirty-eight white lead workers.

J. I. H.
May, 1930

Schnitter gives particulars of the blood pressure of seventy-five white lead workers according to the duration of their employment, from one to three months to periods of years, giving at the same time particulars of the proportion of punctate basophilia present. In only four cases, and these were old chronic cases of nephritis, did he find a blood pressure of over 140 mm. Hg. Quite a number had blood pressures from 80 to 100.—T. M. L.

THE SOLUBILITY OF LEAD SALTS IN PHYSIOLOGICAL SALT SOLUTIONS. *L. C. Maxwell and F. Bischoff. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1929, vol. 36, pp. 279–293, in Physiol. Abstr., Feb., 1930, vol. 14, p. 673.*

The use of colloidal tri-lead phosphate in the treatment of cancerous growths is based on the assumption that the more acid reaction of the growth will cause the formation of the relatively soluble acid lead phosphate. These observations were carried out in order to determine what would be the likely concentration of lead to be found in such growths when under treatment. The solubility of tri-lead phosphate in salt solutions comparable to the ionic strength of the blood at acidities from hydrogen ion concentration 5.7 to 7.3 was determined. It is concluded that in solutions of tri-lead phosphate containing excess phosphate the solubility product law does not apply, due probably to the formation of intermediate ions whose equilibrium relations are unknown. Tri-lead phosphate is soluble in a salt solution isotonic with blood at hydrogen ion concentration 7.35, and containing 4 mg. phosphorus per 100 c.c. to an extent of 3.6×10^{-7} mols. lead per liter. Lead carbonate dissolves in a salt solution isotonic with blood, and containing bicarbonate and carbon dioxide as in blood, to the extent of 1×10^{-6} mols. lead per liter. Some support is given to the view that a double lead-calcium phosphate is formed when ionic lead enters the blood stream.—C. K. D.

IS BASIC LEAD SULPHATE A NONTOXIC SUBSTITUTE FOR LEAD CARBONATE? *Koelsch. Abstr. as follows from Zentralbl. f. Gewerbehyg., Dec., 1928, N. S. vol. 5, pp. 354–358, in Bull. Hyg., Dec., 1929, vol. 4, p. 984.*

Koelsch describes the "booming" in Germany of basic lead sulphate ($2PbSO_4.PbO$) as a nontoxic paint which is advertised under the trade name of *Sulfobleiweiss*. He carried out a number of experiments on guinea-pigs (by feeding and inhalation) and compared the results with similar experiments with lead carbonate.

His results showed that the basic lead sulphate was slightly less toxic than lead carbonate but it was still highly poisonous. His experiments, therefore, agree in the main, in their conclusions, with those made by Schwarz and Sieke (see THIS JOUR., 1929, vol. 11, Abstr. Section, pp. 244–245).—T. M. L.

REPORT ON THE QUESTION OF THE HYGIENIC PERMISSIBILITY AS A PAINT OF ZINC OXIDE WITH A LEAD CONTENT OF MORE THAN 2 PER CENT. *K. B. Lehmann. Abstr. as follows from Zentralbl. f. Gewerbehyg., Dec., 1928, N. S. vol. 5, pp. 358–370, in Bull. Hyg., Dec., 1929, vol. 4, pp. 984–985.*

The Draft White Lead Convention agreed to at Geneva in 1922 excluded

white lead from use in the interior painting of buildings and limited the amount of lead in zinc oxide to 2 per cent. The point submitted to Lehmann by the Metal Smelters' Union was that (1) limitation to not more than 2 per cent. was not justified on hygienic grounds, and (2) compliance with the requirement places a great burden on the zinc oxide manufacturers as most of their production would be excluded from use as paint as it contains rather more than 2 per cent.

This thorough investigation of the subject, coming from so distinguished an authority, is valuable and should carry great weight. It was carried out systematically in five large works by physical examination of large numbers of men as to signs of lead absorption or poisoning, dust determinations, and records of absenteeism on account of sickness.

He first describes the composition of the ores and methods of manufacture of zinc oxide. As much as 10 per cent. of lead was sometimes found in the finished material; it was rarely below 4 per cent. Notwithstanding this his main conclusions are that: (1) Very slight effects of lead were traceable among 177 men coming into contact daily with very large quantities of zinc oxide dust containing generally 5 to 10 per cent. of lead. (2) His results in this respect agree with those of Dr. Engel of the State Health Office, and the conclusion can be drawn most emphatically that a paint containing 5 per cent. of lead is negligible in any effects it can have on painters and decorators. Even if it contained 10 per cent. little objection could be raised to its use. In this state it would be eight times less injurious than a white lead paint mixed with oil.

Real clinical cases of lead poisoning in zinc oxide preparation have been very rarely described and have been complicated by possible exposure to actual work in lead processes.

Lehmann found only 3 per cent. of the 177 men examined with sufficient signs to make him suspect effects of lead although they worked daily for eight hours exposed to material, in a fine state of division, containing lead. —T. M. L.

PARATHORMONE IN TREATMENT OF RADIUM POISONING. *F. B. Flinn and S. M. Seidlin. Abstr. as follows from Johns Hopkins Hospital Bull., Nov., 1929, vol. 45, p. 269, in Jour. Am. Med. Assn., Nov. 30, 1929, vol. 93, p. 1763.*

Three cases of radium poisoning in luminous dial painters have been subjected by Flinn and Seidlin to treatment by injections of parathyroid extract-Collip. The first case showed a loss of 45.6 per cent. of radioactivity in seven weeks. The second case showed a loss of 57.7 per cent. in seven weeks. The third case showed a loss of 50.5 per cent. in seven weeks. All three patients show characteristic roentgen lesions in the skull—round, sharply circumscribed areas of rarefaction. A piece of skull removed during necropsy in a recent case of radium poisoning showed similar roentgen lesions.—K. R. D.

EXPERIMENTS WITH TITANIUM OXIDE. *L. V. Blina. Abstr. as follows from Riforma med., 1928, vol. 44, pp. 1516, 1519–1522, 1525, in Bull. Hyg., Dec., 1929, vol. 4, pp. 989–990.*

Titanium used as a component of paints is said to have all the good prop-

erties of lead, and owing to its innocuity it was recommended as a substitute for the latter. The author undertook a series of experiments to ascertain the harmlessness to health of the titanium, and administered it orally, subcutaneously, and by inhalation to dogs for periods up to two months. Neither the clinical picture nor the sections of organs made postmortem showed anything abnormal, and the blood picture remained unaffected. Guinea-pigs which were made to inhale the powdered titanium for thirty days showed fibrosis of the lungs and enlargement of peribronchial glands. The powdered titanium is very little used in the trade, and workmen are rarely exposed to the danger of inhalation. A series of workmen handling titanium were clinically examined and showed no apparent abnormalities. The author thinks that the harmlessness of the oral administration of titanium sulphate or titanium oxide is due to the insolubility of these salts.—H. L.

DUST HAZARDS AND THEIR EFFECTS

Hygienic Aspects of the Industrial Dust Problem. *P. Drinker. Heating, Piping and Air Conditioning, Jan., 1930, vol. 2, pp. 5–8.*

This is a brief, popular account of dust inhalation in industry: the importance of particle size and of the chemical composition of the dusts breathed, the amount of dust retained, and the application of preventive measures.—M. G. P.

Latest Ideas on Injury by Dust and its Prevention. *L. Teleky. Reichsarbeitsbl., Sept., 1929, pp. 229–234.*

This paper was read before a meeting of engineers. Some dusts, like chromium, attack the skin; some, like pollen, cause hay asthma; some, like lead, poison the whole body; while others, acting over long periods, damage the air passages, causing, if the particles are large, pharyngitis and bronchitis, and, if the particles are minute, acute or chronic pneumonia upon which tuberculosis may be superimposed. These minute particles often act physicochemically; it is so for silica dust, the most harmful of all dusts. Contrasted radiographs show the different effects produced by prolonged inhalation of dust of chalk, emery, and silica. The fibrosis due to silica, which is caused by the finest of dust, not visible to the eye, and which takes years to develop, paves the way for tuberculosis. Such small dust is too light to settle, and cannot be brought down by spray; it can be precipitated electrically. The Kotzé konimeter and Owens' counter are the simplest means for estimating the dust content of air. The results obtained by any method used are not exact, and can only be compared with results from the same method at other times.

Respirators are not reliable for preventing dust inhalation, as fine dust passes like a gas through any filtering material, or else round the edges. Whatever will effectively stop dust must definitely impede breathing. Clean air can be played into a mask placed over the face, and so keep all dust away from the worker; the device is only useful if the worker stays in one place. Every effort must be made to suppress

dust or to prevent its access into the air of a workroom.

Artificial abrasive wheels are advantageously turning out grindstones; they give off far less dust and contain little or no silica. Fine silica dust in droplets of moisture, which are thrown off from grinding on wet sandstones, is particularly injurious, although the air looks clear of dust. Tubercle bacilli are similar in size to harmful silica dust and are conveyed in moist droplets.

The use of water with rock drills is not a solution of the dust problem, for which the services of the technical engineer are needed. Too often today dust exhaust appliances are either defective in structure or not effective in action.—A. J. C.

THE RELATIVE INFLAMMABILITY OF COAL DUSTS: A LABORATORY STUDY. *A. L. Godbert and R. V. Wheeler. Safety in Mines Res. Board, Paper No. 56. H. M. Stationery Office, 1929.*

Coal dusts vary greatly in their degree of inflammability, but there has not existed hitherto a laboratory test of this inflammability capable of replacing satisfactorily the laborious and rather costly method of repeated trial in large scale explosion galleries. The difficulties involved in producing a simple test were discussed in Safety in Mines Research Board Paper No. 31 published a year or two ago. Such a test has now been evolved and is described. The method of test is to measure the inflammability by ascertaining the proportion of inert dust necessary to suppress inflammation when small quantities are blown by oxygen through a heated tube. It has been proved to give results comparable with the explosion gallery trials.

A refinement of the same test was used to study the effect of the fineness and chemical composition of coal dust on its inflammability. Safety in Mines Research Board Papers 33 and 48 had shown that the inflammability of a coal dust ran roughly with its volatile matter content, but there were notable exceptions to the general rule. The present paper proves that there is a much closer relationship between the inflammability of a coal dust and the reactivity of its ulmin compounds, as demonstrated by their relative capacity for absorbing oxygen. Occluded gases were found not to affect materially the inflammability of the dusts.

THE HEALTH OF THE WORKERS IN THE GERMAN CERAMIC INDUSTRY, ESPECIALLY THE PORCELAIN INDUSTRY, WITH PARTICULAR REGARD TO THE QUESTION OF TUBERCULOSIS. *K. B. Lehmann. Schrift. a. d. Gesamtgeb. d. Gewerbehyg., N. S. no. 25, 1929, pp. 55.*

This report reviews the previous investigations on the health of workers in the German ceramic industry, including surveys made in a number of specific plants in 1912. The author discusses the kind and amount of dust produced by various processes in the porcelain industry and the resulting health hazard. He reviews the morbidity and mortality statistics relating to the industry and points out that a study of the incidence of tuberculosis among porcelain workers should include a study of the incidence of chronic lung illness as well. The earlier statistics for tuberculosis are too high, as they do not differentiate between tuberculosis proper, chronic lung affection, and silicosis and fibrosis. Later statistics fail to establish an

occupational risk from tuberculosis among porcelain workers, but they show a proportionately high risk from lung illness. The dusted lung is seldom found before the fifth year of employment; after that time, it is found in a considerable percentage of all workers. It has been generally assumed that workers with fibrosis, in the older age groups, acquire tuberculosis in a light form, but whether they actually die from tuberculosis, or simply from the effect of the fibrosis on the heart and lungs, or from other causes, it is impossible to say from the available facts.

The author recommends dust control in the porcelain industry, more careful supervision of the workers' health, and studies in other branches of the ceramic industry.—M. G. P.

STUDIES ON EXPERIMENTAL PNEUMONOKONIOSIS. V. THE REACTIVATION OF HEALING PRIMARY TUBERCLES IN THE LUNG BY THE INHALATION OF QUARTZ, GRANITE AND CARBORUNDUM DUSTS. *L. U. Gardner. Am. Rev. Tuberc., Dec., 1929, vol. 20, pp. 833–875.*

A series of guinea-pigs has been primarily infected by the inhalation of tubercle bacilli of low virulence. In normal animals such infection produces isolated subpleural pulmonary tubercles which attain a state of caseation, then retrogress, and finally heal by resolution. As a part of the picture of primary infection, the tracheobronchial lymph nodes are also involved, and the lesions in this location undergo a similar series of changes. At serial intervals, ranging from 54 to 206 days, and in a few cases 400 days, after such infection, groups of four animals were removed to each of three dusting chambers where they were exposed to the inhalation of quartz, carborundum, and granite dust until they died or were killed.

The experiment has demonstrated that the inhalation of these three dusts will stimulate a renewed multiplication of bacilli in the healing tubercles, an effect which is often followed by widespread chronic ulcerative tuberculosis. All the manifestations of that condition seen in man, with the exception of caseous pneumonia, have been encountered. At least two months' exposure to the dusts is necessary to affect the primary foci of infection, and usually more time is required. Reactivation of primary tubercles has occurred as late as 206 or even 400 days after infection. With quartz, 73.6 per cent. of the animals exhibited evidence of progressive tuberculosis, with carborundum there were 31.8 per cent., and with granite only 26.3 per cent. This result has not been obtained by the inhalation of all types of dust. Marble and soft coal have exhibited no stimulating effect. The reaction appears to be a specific result of the inhalation of certain definite types of dust, for evidence has been produced to show that factors like overcrowding, lack of proper ventilation and light, endemic pneumonia, and nonspecific inflammations have not influenced this type of tuberculous infection.

In partial explanation of the results obtained, it has been shown that a renewed multiplication of bacilli takes place only in those tubercles containing ample amounts of dust. Since the lesions were already established at the time when the inhalations were begun, the dust particles would have to be

carried into the nodule by phagocytes. It was shown that relatively few quartz particles were ingested by any one phagocyte, and that the activity of these cells was not affected; perhaps it was even accelerated. On the other hand, so many carborundum and granite particles were taken up by the majority of the cells that their powers of locomotion were lost and very little dust could be carried into the tubercles. Various theories have been discussed which might explain the nature of the reaction between inhaled dust particles and the tubercle bacilli, and the methods proposed for the further study of the problem have been outlined.

It is believed that the evidence submitted may be applied to human pneumonokoniosis and that it affords reason for thinking that all tuberculosis complicating this condition is not necessarily an exogenous industrial infection. In a certain proportion of the cases, it seems probable that inhaled dusts of the proper type may light up preexisting quiescent foci of infection or disease.—*Author's Summary.*

WILL THE INHALATION OF SILICEOUS DUSTS ACTIVATE A PARTIALLY HEALED FOCUS OF TUBERCULOUS INFECTION? AN EXPERIMENTAL STUDY. *L. U. Gardner. U. S. Pub. Health Rep., Feb. 7, 1930, vol. 45, pp. 282–288.*

This is a brief outline of the material reported in full in the *American Review of Tuberculosis* for December, 1929 (see preceding abstract).

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

THE LOCAL ACTION AND RESORPTION OF CARBON TETRACHLORIDE AND CHLOROFORM BY THE SKIN. *G. Lapidus. Abstr. as follows from Arch. f. Hyg., Aug., 1929, vol. 102, pp. 124–131, in Jour. Am. Med. Assn., Dec. 14, 1929, vol. 93, p. 1923.*

In a study of the percutaneous resorption of carbon tetrachloride and chloroform applied to the ears of rabbits, Lapidus noted that both substances caused the ears rapidly to become hyperemic and then markedly inflamed. Vesicles appeared and gave the condition the appearance of a second-degree burn. While these changes were in progress there occurred a slight resorption of chloroform from the ears (in one ear from 40 to 70 mg. and in two ears from 82 to 140 mg.). Small quantities of chloroform were found also in the blood, liver, and fat.—K. R. D.

ECZEMA CAUSED BY BAKELITE VARNISH. *F. Blumenthal and K. Jaffé. Abstr. as follows from Med. Klin., Nov. 29, 1929, vol. 25, p. 1848, in Jour. Am. Med. Assn., Feb. 1, 1930, vol. 94, p. 373.*

Blumenthal and Jaffé describe seven persons who had weeping eczema on the uncovered portions of the body, especially the hands. All of these patients were employed in an industrial plant, where they worked with bakelite varnish, oil of turpentine, shellac, wood oil, benzene, and hard paper. When the patients remained away from work and were treated properly, the eczema healed. In order to determine which of the various substances

that the patients had worked with had caused the eczema, the authors made skin tests. It was found that the bakelite varnish was the cause of the eczema. The authors further investigated which of the various constituents of bakelite varnish caused the eczema. They found that all who had developed eczema showed a hypersensitivity to phenol.—K. R. D.

PHOSPHORUS DERMATITIS. *J. Nicolas, J. Gaté, and J. Rousset. Abstr. as follows from Ann. de dermat. et syph., Sept., 1929, vol. 10, p. 921, in Arch. Dermat. and Syph., Feb., 1930, vol. 21, p. 306.*

The authors give an extensive clinical and experimental report on occupational dermatitis occurring among employees of a match factory. The disease is due to phosphorus sesquisulphide. The lesions develop rapidly, first on the exposed parts, but soon become generalized. The eruption is erythematous primarily but rapidly becomes vesicular or pustular. Occasionally, small necrotic areas appear. The outbreak is accompanied by severe subjective sensations. The attack rapidly subsides. A severe conjunctivitis is often present.

The authors produced the eruption in volunteers, with a paste containing phosphorus sesquisulphide. Similar results were obtained in experimental animals.

Pathologically, the lesions presented a banal dermatitis of varying intensity. The powdered chemical alone seems capable of producing cutaneous lesions and requires intimate contact with the skin before deleterious effects occur. Oxidation likewise plays a rôle. Greasy skins are more susceptible than dry ones.

As the chemical in powdered form is most dangerous, industrial plants using phosphorus should install machinery to prevent its diffusion in the air. Workers should also wear special garments which prevent the powdered phosphorus sesquisulphide from reaching the skin. For the eruption, a watery solution of potassium permanganate and sodium bicarbonate is indicated.

DETACHMENT OF THE ZONULAR LAMELLA IN GLASSWORKERS' CATARACT. *A. Pflügk. Abstr. as follows from Klin. Med. f. Augenh., Oct.-Nov., 1929, vol. 83, pp. 549–550, in Am. Jour. Ophth., March, 1930, vol. 13, p. 272.*

In a glassworker aged 69 years who had worked for fifty-five years before the open furnace, were found progressive cataractous opacities and detachment of the zonular lamella in both eyes. There was also in the pupillary area of the anterior capsule of each eye a circular opaque zone with sharp indented borders, visible only with the slit-lamp. The author attributes the condition to the action of radiating heat.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

MINOR INJURIES TO THE EYE IN INDUSTRY. *B. Cridland. Brit. Med. Jour., Oct. 5, 1929, vol. 2, pp. 615–617.*

Probably about 10 per cent. of all cases of blindness are due to accidents, most of which occur in industry, while

about 5 per cent. of all industrial accidents are injuries to the eye. American statistics place accidents as responsible for 13.5 per cent. of all cases of blindness in the United States. Minor eye injuries are extremely numerous, particularly in certain industrial areas where the workers are exposed to flying particles from emery wheels or chips of metal. The author calculates that three minor eye injuries mean one whole day's loss of output. He finds that no protection was being used in 70 per cent. of the cases, that it was available but not used in 19 per cent., and that it was used mostly in the form of imperfect goggles in 11 per cent. The average time between the accident and attendance at hospital was sixteen hours, during which period increased liability to infection was taking place. Eye accidents tend to increase at the end of the day, at the end of the week, and with any influence which increases fatigue, either mental or physical.

Prevention lies either in eliminating the flying particle or in keeping it from reaching the eye. Goggles of the right kind form 100 per cent. protection, as against 90 per cent. offered by shields attached to the machinery; but it is difficult to induce men to wear goggles. Fine silk gauze instead of glass has been used to protect the eye. Probably greatest success in prevention will come from engineering revision of processes, which will make both goggles and guards unnecessary. So long as the wonderful spirit of indifference to danger so characteristic of the British employee persists, prevention must depend rather on elimination of risk than on the invention of protection against risk.—E. L. C.

THE PROTECTIVE VALUE OF CERTAIN SPECIAL TYPES OF SPECTACLE GLASS. *J. M. Patton. Jour. Am. Med. Assn., Oct. 19, 1929, vol. 93, pp. 1190–1193.*

Patton presents evidence to show that laminated glass in spectacles affords the maximum protection against ocular injury. When glasses are prescribed for younger children or for persons engaged in occupations with a high eye hazard and for all persons with but one useful eye, no matter what the age or occupation, this type of glass should be prescribed. Though the laminating substance now in use is not absolutely free from slight imperfection, the high degree of protection afforded more than makes up for this defect.

As an alternate substance, tempered glass is much superior in protective value to ordinary optical glass and, except for its tendency to splinter into sharp fragments, is very acceptable.

No matter what type of lens is selected, it must be mounted in a comfortable, good-looking frame, if constant wear is to be expected.—K. R. D.

ACCIDENTS IN "SOBADORA" OPERATIVES. *J. Arce, O. Ivanissevich, and R. C. Ferrari. Abstr. as follows from Semana méd., 1929, vol. 36, pp. 142–160, in Bull. Hyg., Dec., 1929, vol. 4, pp. 993–994.*

"Sobadora" is a machine used in mechanical bread making. By derivation it is a kneading machine. Essentially it consists of two metal rollers which may be separated by an interval of 3 mm. to 3 cm. These rollers work in opposite directions. The dough is placed by hand in the

upper part of the machine and pushed into contact with the rollers. Apart from carelessness, the mere stickiness of the dough may lead to the fingers being caught between the rollers, and the resultant injury will depend on the space between them and the rapidity with which the limb can be withdrawn or released. Illustrations are reproduced revealing all stages, from mere crushing of fingers to avulsion of part of the arm.—H. H. S.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

SIMPLIFICATION OF RESPIRATION EXPERIMENTS BY THE DOUGLAS-HALDANE METHOD. *E. A. Müller. Abstr. as follows from Arbeitsphysiol., 1929, vol. 2, pp. 18–22, in Chem. Abstr., Nov. 10, 1929, vol. 23, p. 5206.*

Douglas bags were lined with thin metal foil and vulcanized. This reduced the passage of carbon dioxide so that mercury samplers were not necessary. A modified three-way valve and automatic arrangement for operating the Haldane gas analysis apparatus are described.

CHANGES IN WHITE BLOOD PICTURE FOLLOWING MUSCULAR ACTIVITY AND ITS PRACTICAL SIGNIFICANCE. *F. Gaisböck. Abstr. as follows from Wien. klin. Wchnschr., Oct. 10, 1929, vol. 42, p. 1309, in Jour. Am. Med. Assn., Dec. 14, 1929, vol. 93, p. 1925.*

Gaisböck made tests on persons before and after physical exercise. He asserts that not only the circulation and the breathing but also the blood picture reveal marked changes. An increase in the number of leukocytes is noticeable immediately after muscular exertion. The degree of the increase varies between 15 and 66 per cent. above the values that were determined in the morning before the person had taken any food. The shifting to the left develops and subsides again simultaneously with the leukocytosis. These changes are strongest during the time when the largest quantities of lactic acid are brought into the blood stream, and when hyperpnea and the acceleration of the pulse are strongest. The author points out that, according to some authorities, the lactic acid is the main cause for these changes. Accordingly he reasons that if a person is given alkaline substances the blood picture will show different characteristics. Parallel tests were made on two persons who had been subjected to the other examinations. Ten minutes before the exercises they were given 15 gm. of sodium bicarbonate. The tests, which were made after the muscular exercise, showed that the leukocytosis developed later and did not become as marked as in the other experiments. The author thinks that the buffering of the lactic acid by the alkali causes these differences. However, not only the products of muscular metabolism but also hemodynamic processes exert an influence on the blood. Simultaneously with the changes in the blood cells an increase in the volume of the circulating blood was noted. The author thinks that when the blood is forced out of the spleen, immature cells are carried into the blood stream. The practical significance of the

changes in the blood picture is summed up as follows: The leukocytosis and the shifting to the left are either caused by exertion or are symptomatic of pathologic conditions. If they do not subside after a short time, the organism has been overtaxed and the individual should refrain from sport activities until normal conditions have been restored. By means of test exercises it can be determined whether the changes are only temporary or permanent.—K. R. D.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

CAISSON DISEASE. *F. J. O'Donnell. Irish Jour. Med. Sc., Sept., 1929, pp. 618–622.*

Experiences are described of compressed air work during the construction of the Liffey tunnel between April, 1927, and March, 1928. Pressures in excess of 27 pounds were used only occasionally; nevertheless a number of cases occurred of pains in the knees and elbows after decompression. The pains are due to nitrogen dissolved in the blood at the high pressure forming bubbles when the pressure is removed, just as gases bubble when a soda water bottle is opened. Recompression redissolves the bubbles and is the accepted treatment; for this purpose a "medical" lock on the surface was installed. The cases which occurred were related to dampness of the air. Men with a systolic blood pressure of over 130 should not be employed at this work. No fatality occurred; one case of typical myelitis developed, but since the pressure was only 23 to 24 pounds at the time, the origin of the disease was doubtful.—E. L. C.

HELIUM IN DEEP DIVING AND CAISSON WORKING. *J. H. Hildebrand, R. R. Sayers, and W. P. Yant. Abstr. as follows from Nature, 1928, vol. 121, pp. 577–578, 591, in Bull. Hyg., Dec., 1929, vol. 4, p. 996.*

The amount of air dissolved in the blood stream depends upon the atmospheric pressure to which the body is subjected. It is raised when workers are subjected to high pressures in deep diving and caisson working. On decompression the air is released from the blood, and if the decompression is rapid, it is released in the form of bubbles, just as occurs when a bottle of soda water is opened. These bubbles forming in the blood may block the arterioles or capillaries, and so cause caisson illness, with severe bodily pains and even death if the blood supply is interfered with for a vital center. The gas which causes the trouble is the nitrogen; the excess oxygen is disposed of in ordinary combustion processes. The suggestion has been made that, if the nitrogen was replaced by helium, advantage would be gained, because helium is the least soluble of gases. An account is now given of experiments on a large scale, undertaken by the Bureau of Mines in America, to make the idea practicable. Rats subjected to a helium-oxygen mixture for one hour at a pressure of 20 atmospheres, corresponding to about 600 feet of

water, were brought out safely in thirty-four minutes. It was found important to reduce the proportion of oxygen from 21 per cent. by volume to a smaller proportion, varying from 1.5 to 15 per cent., according to the pressure employed. Animals subjected to a pressure of 10 atmospheres for five hours were safely decompressed in four to seven minutes, whereas if a nitrogen-oxygen mixture were used many died at once or within a few days when decompressed in twenty-seven minutes. Helium was found to have an advantage over nitrogen, not only on account of its smaller solubility, but on account of its diffusing more rapidly, due to its smaller molecules. Large scale experiments with men are now in progress. Apparently atmospheres are coming into use consisting at first mainly of oxygen and nitrogen, but containing a lower percentage of oxygen than does the air, and then later, while under compression, helium is substituted for nitrogen.—E. L. C.

ELECTROPATHOLOGY. A REVIEW OF THE PATHOLOGIC CHANGES PRODUCED BY ELECTRIC CURRENTS. *R. H. Jaffé. Arch. Path., 1928, vol. 5, pp. 837–870.*

This is a valuable review to which is appended an extensive bibliography.

INDUSTRIAL ENVIRONMENTAL CONDITIONS

THE CONTROL OF HUMIDITY AND TEMPERATURE AS APPLIED TO MANUFACTURING PROCESSES AND HUMAN COMFORT. *W. H. Carrier. Heating, Piping and Air Conditioning, Nov., 1929, vol. 1, pp. 535–543, 605–616.*

This paper was prepared by the author, with the assistance of a committee of ten appointed by the American Society of Heating and Ventilating Engineers, for presentation at the World Engineering Congress, Tokyo.

After discussing the history, development, and purpose of air conditioning, as well as the physical principles underlying it, Carrier reviews the results of experimental researches on the effects of air conditions on working efficiency, comfort, health, sickness, and mortality. The last part of the report deals with the various types of equipment used in modern air conditioning installations.

This paper gives the most concise and complete account now available to the student of air conditioning. Much of the fundamental work described was done by the author himself, who is a pioneer in the science of air conditioning and an inventor of note.—C. P. Y.

STUDIES ON HEAT REGULATION. I. THE EFFECT OF DRINKING SALTY WATER ON THE CONCENTRATION OF SODIUM CHLORIDE IN HUMAN SWEAT AND BLOOD DURING EXPOSURE TO HIGH ENVIRONMENTAL TEMPERATURES. *M. Marschak and L. Kraus. Arch. f. Hyg., 1929, vol. 101, no. 5, pp. 297–307.*

The authors summarize their results as follows:

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1. The concentration of sodium chloride in sweat increases with the length of exposure to high environmental temperatures.

2. Sweating diminishes the percentage of sodium chloride in the blood and serum.

3. Intake of water during sweating increases the sodium chloride and water output.

4. The changes in salt-water metabolism due to sweating are reduced by the intake of a 1 per cent. solution of sodium chloride.—W. K.

STUDIES ON HEAT REGULATION. II. THE EFFECT OF HIGHER ENVIRONMENTAL TEMPERATURES ON THE PHYSICAL CONDITION OF THE BLOOD AND ON HEAT REGULATION IN MAN, IN CONNECTION WITH THE INGESTION OF WATER AND COMMON SALT. *M. Marschak and O. Dukelsky. Arch. f. Hyg., 1929, vol. 101, no. 6, pp. 325–337.*

This paper is summarized as follows:

1. Men at rest in high environmental temperatures show at first an apparent dilution, later a thickening, of the blood. Coagulation of the blood increases with length of exposure. Most of the subjects were unable to remain in the experimental chamber for more than two hours when the temperature was 46°C.

2. Water intake has an insignificant effect upon the condition of the blood. In some cases, coagulation of the blood was definitely less when water was taken. In some persons, the drinking of water is accompanied by secretion of urine. The drinking of water improves the general condition of the subject enough to permit him to prolong his exposure to three hours.

3. Sodium chloride (1 per cent. solution of crystalline sodium chloride with water taken afterward) causes dilution of the blood, an effect which persists during the three hours' exposure and considerably improves the general condition of the subject.

4. Muscular exercise in high environmental temperatures causes blood coagulation soon after the work is started. The drinking of water improves the condition very slightly; whereas the taking of sodium chloride diminishes coagulation markedly, or even eliminates it entirely.

5. In high environmental temperatures (whether the subject is at rest or at work) the body temperature tends to rise accordingly. Sodium chloride is more effective than water in preventing this increase in temperature.

6. From practical experience, the following conclusions may be drawn: (*a*) Loss of sweat cannot be compensated for by drinking water. (*b*) In addition, the organism must be provided with chlorides, especially sodium chloride. (*c*) Sodium chloride can be taken in 0.5 to 1 per cent. solution, as well as in powdered form or in food rich in salt (herring, etc.). (*d*) The quantities of water and sodium chloride to be administered depend upon the length of exposure, type of work, and temperature and humidity conditions.—W. K.

THE HEAT INSULATING PROPERTIES OF CLOTHING, MEASURED BY MEANS OF THE DAVOS FRIGORIMETER. *J. von Vintschger. Arch. f. Hyg., 1929, vol. 101, no. 5, pp. 261–289.*

The relative heat insulating properties of various types of fabrics were determined in still and moving air at different temperatures by means of an apparatus called the Davos frigorimeter. In principle, this new instrument somewhat resembles an electric kata-thermometer. The author claims that it is much superior to the kata for the purposes of this particular study. —W. K.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

SAFETY AND COMFORT IN INDUSTRY. *Foreign Letter (London), Jour. Am. Med. Assn., Feb. 22, 1930, vol. 94, p. 570.*

The industrial museum of devices to promote the safety and comfort of workers has had some recent acquisitions as the result of research by individual firms or by the museum staff. Two models of ventilating shafts have been constructed to show the evils of a shaft with acute angles; another following the same course shows how, by stream-lining, a free flow may be assured and the diameter of the shaft gradually reduced after each junction. There is an air tight chamber equipped to produce hot, humid, and stagnant atmospheres and to show the relief which movement of the air, without actual ventilation, can bring. The reduction of noise by preventing echo resonance is demonstrated. The museum has taken up the recent idea of absorbing vibrations by layers of seaweed. The pneumatic chisels used by the modern stone cutter produce much more dust than the old mason's chisels. For the prevention of silicosis the museum has in operation a pneumatic tool fitted with a cowl, into which most of the dust is sucked. Seats for workers at all sorts of jobs are shown—tip-up seats for use in brief intervals, adjust-

able seats, tiny low seats on roller skates used in artificial silk factories where the operatives have to change bobbins near the floor, and seats running on a sort of tramway for tapestry workers. All these illustrate the modern idea that fatigue lowers output. Some of the safety devices are an advance on the old idea of fencing; they are moving guards which push the hand of the operative into safety. A safety sausage machine is important in view of the frequency of accidents. The new machine has a feeding throat 7 inches long and only $2\frac{1}{2}$ inches wide, so that the hand of the smallest assistant can no longer follow the meat down to the revolving knives.

REPORT OF THE FOURTH SESSION OF THE PERMANENT INTERNATIONAL COMMITTEE ON OCCUPATIONAL DISEASES. *Lyons, 1929.*

The Aetiology of Silicosis. A. Mavrogordato. Pp. 1–23.

Recognition of the specific part played by silica in causing dust phthisis is recent. The lesion resulting from inhaling silica dust is known as silicosis; and the condition may be uncomplicated, with no infective element present, or it may be complicated by infective processes, of which tuberculosis is the most common. The macrophage is the cell concerned with the aggregation of both silica particles and tubercle bacilli; hence the formation of pseudo-tubercles in silicosis. There is evidence that silica particles are slowly soluble in the tissues, when the cells carrying them lose their vitality and function. The particles stimulate the production of macrophages, and also of young fibroblasts which, in their turn, become dust laden and are converted into irreversible fibrotic tissue. The reaction depends upon concentration of fine dust, duration of exposure, and conditions of exposure. Lungs rid themselves of some dusts less readily than of others; dust accumulation is a factor in the formation of fibrosis. Silica dust is got rid of with difficulty. Dust laden cells travel fast and exhibit a pleural drift; hence the pleural thickening so characteristic of the condition. Pigmentation is frequent and permanent with silicosis, in contrast with that in a coal miner, who, in a year or so away from the pit, loses much of his pigment; in fact, silica anchors other dusts.

A phthisis producing dust so modifies the lungs that ability to deal with aftercoming infection is physically impaired, even without impairment of health. Similarly, pneumococci may be retained by such lungs. Such superimposed infection changes the picture; for the dust and the infective agent facilitate each other's action. Clinically there may be an infective agent from the beginning, or it may be introduced at any state of silicosis. Today all fatal cases of miners' phthisis on the Rand are unmistakably tuberculous. Light and dryness are enemies to the tubercle bacillus. Underground workings in gold mines are dark and damp, with water droplets of the right size for carrying infection. Probably the inhalation route is the common path of tuberculous infection in dusty trades. A safe threshold of dust is difficult to fix, since individuals vary in their capacity for eliminating different types of dust.

The Diagnosis of Silicosis as an Occupational Disease. L. G. Irvine. Pp. 43–91.

This important article consists of two parts. The first deals with the clinical pathology of silicosis considered in relation to diagnosis, in which a brief account is given of the way in which clinical, radiographic, and pathologic evidence is correlated in diagnosing silicosis. The disease is the product of dust and tuberculosis. The initial changes are due to dust; but the importance of a dust factor is the predisposition it causes to tuberculous infection. The silicotic process is essentially a progressive lymphatic fibrosis, which begins with minute changes at many points and develops gradually. The appearance of the disease coincides with a visible and palpable fibrosis in the form of miliary nodulation of the lungs and pleurae. The appearances of simple silicosis are described; but evidence is adduced to suggest that in a majority of cases of apparently simple silicosis, there is early association with latent tuberculous infection. Acute infections may run a normal course in a silicotic lung; but more chronic infections are modified by the production of massive infective fibrosis, particularly in the case of tuberculosis. A change of type of silicosis has been occurring on the Rand, and today most cases seem clinically to be uncomplicated by tuberculosis; but pathologic evidence negatives the finding. Generally silicosis, whether simple or not, is progressive, and its tuberculous nature finally becomes manifest.

The second part of the paper deals with the clinical and radiographic diagnosis of silicosis. It is illustrated by a valuable series of twenty-two radiographs. The characteristic feature of silicosis is that it is a generalized condition of the lungs, which is distinctive alike of pathologic changes, radiographic appearances, and clinical signs. The most reliable criterion is the radiograph; the radiographic appearances distinguishing various stages are discussed in detail and illustrated, as are also the changes which occur when active tuberculosis supervenes. The detection of disease at every stage calls for expert medical examiners. Reference is also made to the financial cost of the disease due to compensation, which has amounted, during the past three years, approximately to one million per year; the disease is, then, worth eliminating.

Bochum Clinic for Silicosis. Böhme. Pp. 101–116.

A discussion is presented of the clinical symptoms of silicosis based on radiography, which enables the disease to be detected early. Pathologic findings agree with the X-ray picture. Extensive fibrosis of the lung may be present without tuberculous infection; but in severe cases it is usually present and found postmortem in two-thirds of them. During life, tubercle bacilli were detected in nearly 40 per cent. of the cases seen at the clinic. The development of unilateral diffuse shadows is a sign of tuberculous infection, as is also a change of the heart shadow from the normal into the vertical shape. Nevertheless, the X-ray picture may not give sure evidence; then recourse must be had to clinical signs and symptoms. Dust in the lungs may continue its harmful influence after dusty work has been abandoned; the degree of fibrosis de-

pends on the amount of silica in the lungs. The disease is common among miners of the Ruhr who drill stone; and all men employed in an atmosphere containing silica dust should be examined regularly by X-ray.

Clinic for Lung Diseases Caused by Stone Dust (Pneumonokoniosis—Silicosis). A. Thiele. Pp. 121–130. (See also Méd. du travail, Oct., 1929, vol. 1, pp. 48–50.)

Accurate diagnosis of silicosis has been made possible by X-rays. The disease is associated with occupation, hence a history of exposure is necessary. The symptoms are: dyspnea, sensation of fatigue, perspiration, headaches, vertigo, and palpitation. Tuberculosis may be present even though it cannot be detected. Percussion reveals lowering of the inferior edge of the lung, diminution of the vesicular murmur, and possibly crepitations, particularly if tuberculosis is present. The heart may be dilated, particularly on the right side. Bronchitis, bronchiectasis, and lung gangrene may complicate the case. Why tuberculosis and silicosis should associate is unknown. Three forms may be detected clinically: the bronchitic, the emphysematous, and the bronchiectatic.

Legislation in Various Countries Regarding Silicosis with Special Reference to Compensation. E. L. Collis. Pp. 133–159.

Detailed information is brought together in this article concerning legal enactments granting compensation for silicosis in various countries. At the time of the Congress it was complete except for Germany, where compensation was granted at the commencement of 1929. Otherwise compensation had only been granted in English-speaking countries. South Africa, for its gold mines, set the example, followed by Great Britain, which has gradually extended compensation rights to all industries with exposure to silica dust. In Australia, New South Wales and Western Australia have taken action; the same holds good for the Province of Ontario in Canada. In America compensation is granted for the disease as an injury caused by employment rather than by special reference to silicosis. None of the Latin races so far have granted compensation.

Pneumonokoniosis. M. Sternberg. Pp. 171–181.

The word pneumonokoniosis signifies all diseases of the lungs due to dust, and covers a number of different conditions, such as dust asthma, anthracosis, silicosis, and such infectious complaints as anthrax, tuberculosis, and pneumonia. The physicochemistry of dusts is now coming to be recognized as of capital importance.

Occupational Cataract. A. Elschnig. Pp. 185–204. (See also Med. Klin., Jan. 10, 1930, vol. 26, p. 43.)

Occupational cataract occurs among glassworkers and also furnace workers exposed to incandescent materials. It starts with opacity on the posterior lenticular pole, while the rest of the cortical zone remains transparent. Among 7,000 glassworkers, 0.23 per cent. are operated on annually for cataract; the average age is 57 years, as compared with 64 years for other males with cataract. Damage is occasioned to the corpus ciliare and the iris by heat radiation; possibly ultra-

violet light also exercises an influence. Occupational cataract is therefore ray cataract. Glasses which absorb the injurious rays prevent this form of cataract. Agricultural workers possibly contract cataract from the influence of sunlight, while persons manipulating X-rays and radium may also be affected.

Glassmakers' Cataract. Rollet. Pp. 213–227.

Glassmakers' cataract is a true occupational disease, consisting in posterior polar opacity. It appears after ten or twenty years' work among finishers of bottles, and affects about 17 per cent. of males. It evolves slowly and is seldom noted before age 40, and generally then in the left eye, which is turned by the worker toward the vat of molten glass. Efforts to reproduce this form of cataract experimentally with ultraviolet rays have not succeeded; but it has been reproduced successfully with infra-red rays. Treatment consists in extraction of the matured cataract, after which the worker can resume his work. Spectacles made of glass rich in chrome oxide and uranium cut off the injurious rays. But improvements in the process by which the exposure to the rays is avoided are more likely to be effective in preventing the trouble than the wearing of protective glasses. The disease soon will become of historical interest only.

E. L. C.

PAPERS READ AT THE FOURTH SESSION OF THE PERMANENT INTERNATIONAL COMMITTEE ON OCCUPATIONAL DISEASES, LYONS, 1929. *Méd. du travail, Jan., 1930.*

Pulmonary Anthracosis, Composed Largely of Organo-Metallic Pigment, Giving the Reactions of Iron and Presenting the Syndrome of Chronic Bronchitis with Emphysema, and a Case of Syphilitic Lung. The Part Probably Played by the Liver in Establishing Pulmonary Hemosiderosis. J. Paviot, R. Chevalier, and L. Revol. Pp. 64–81.

A careful piece of research into the constitution of lung pigment is described. The authors hold that all pigmented and fibrosed lung is not due to dust. Pigmentation of a black lung may be of two kinds: (1) an iron pigment, and (2) a black pigment rich in carbon and poor in iron. Investigation of the blood showed the presence of alterations ascribed to insufficient liver action, and particularly of fragility of the cells. Cirrhosis of the lungs with hemosiderosis occurs often in subjects who have, during life, been exposed to no special dust hazard.

Occupational Pneumonokoniosis in the Paving Stone Industry. F. H. de Balsac, E. Agasse-Lafont, and A. Feil. Pp. 82–83.

Clinical manifestations of damaged lungs were found among men dressing gritstone to make slabs for pavements. Cough and expectoration was present in 80 per cent. and physical signs were found in 60 per cent., while radiology disclosed abnormalities in the lungs. Active tuberculosis was discovered in only a few cases. Formerly, 1881 to 1896, all deaths due to lung trouble were ascribed to tuberculosis. More careful diagnosis in the years 1902 to 1926 ascribes thirteen fatalities to tuberculosis as against ten to chronic bronchitis. Practitioners should distinguish carefully between tuberculosis

and pneumonokoniosis masquerading as tuberculosis.

The Relation between Silicosis and Tuberculosis in the Light of Experimental and Clinical Investigations. M. Scheinin. Pp. 86–98.

This paper indicates that in the Ukraine, investigations are being carried out to confirm the work which has been done in reference to silicosis by English-speaking investigators, whose work is freely quoted by the author.

The Problem of Tuberculosis among Porcelain Manufacturers. D. Karpilovsky. Pp. 99–103.

The existence is recognized of tuberculosis among workers making porcelain, which is often associated with pneumonokoniosis, and without doubt is an occupational disease. The observations are based upon clinical examination of the workers at porcelain factories situated at Doulevo and at Verbilky near Moscow. No description, however, is given of the processes carried out or of the dust hazard to which the workers are exposed.

E. L. C.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

The Presence of Basophilic Granular Erythrocytes in Persons without Lead Poisoning. *H. Lehmann. Abstr. as follows from Arch. f. Hyg., Aug., 1929, vol. 102, pp. 111–123, in Jour. Am. Med. Assn., Dec. 14, 1929, vol. 93, p. 1923.*

Lehmann reports the presence in the blood of cement workers and of patients who were being given small doses of alcohol subcutaneously of a larger number of erythrocytes with basophilic granules than is found in the blood of patients with lead poisoning. —K. R. D.

Hemochromatosis. Report of a Case, with Studies of the Copper Content of the Liver. *E. H. Funk and H. St. Clair. Arch. Int. Med., Jan., 1930, vol. 45, pp. 37–45.*

1. A case of hemochromatosis without diabetes is reported.

2. The copper content of the liver was found to be 140 mg. per kilogram of fresh tissue, or 331.8 mg. for the entire organ.

3. The copper content of the spleen was found to be less than 1 mg. for the entire organ.

4. The estimated quantity of iron in the liver is probably inaccurate but was found to be at least 6.2 gm. per kilogram of tissue or 14.7 gm. for the entire organ.

5. No analyses were made for zinc, manganese, nickel, or other heavy metals.

6. It is unlikely that increased hemolysis is the cause of the iron pigmentation.

7. It is likely that the rôle played by copper is secondary to an unknown etiologic agent.—*Author's Summary.*

Injuries of the Spinal Column from Weight Carrying Due to Accident or Occupation. *F. Steinmann and K. Waegner. Abstr. as follows from Schweiz. med. Wchnschr.,*

Jan. 26, 1929, pp. 73–77, in Bull. Hyg., Dec., 1929, vol. 4, p. 993.

This is a plea for greater care in the diagnosis of complaint of pain following the lifting or carrying of weights which is too often assigned to rheumatism or lumbago. The authors' position has given them much experience with injuries among dock laborers and the like. The accident risk among this class is high and a considerable proportion of the accidents lead to injury of the spinal column, more especially in the lumbosacral region. Details of cases are given in which an X-ray photograph revealed structural lesions which had been treated as rheumatism. These took the form of progressive ossification of interspinal ligaments or thickenings of the joint processes.

Two forms have come before them particularly: (1) ankylosing spondylarthritis in which the small joints are first affected while the vertebrae remain intact or are only involved late in the development of the condition; (2) spondylitis deformans, to be distinguished clinically from the former, as it is a primary disease of the vertebrae involving changes of their upper and lower borders leading eventually to bony outgrowths in the joints, also of a kind setting up deformity. This latter is the form commonly found among those carrying heavy weights. —T. M. L.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE DANGERS OF CARBON MONOXIDE POISONING AND MEASURES TO LESSEN THESE DANGERS. REPORT 1 OF THE COMMITTEE ON POISONOUS GASES OF THE AMERICAN MEDICAL ASSOCIATION. *Drafted for the Committee by Y. Henderson. Jour. Am. Med. Assn., Jan. 18, 1930, vol. 94, pp. 179–185.*

The following conclusions and recommendations summarize concisely the data presented in Report 1 of the Committee on Poisonous Gases of the American Medical Association:

Education of the public regarding the hazard of carbon monoxide in daily life now is not enough by itself to prevent numerous cases of asphyxiation. In addition, regulations and their effective enforcement are needed to remedy the common household conditions leading to asphyxiation, such as badly designed stoves, flexible tubing, the quarter meter, and lack of flues on water heaters.

The increasing use of city gas for heating homes may involve a large increase of fatalities both of individuals and of entire families unless an efficient inspection, supervision, and control of household gas appliances is established.

City gas of high calorific value contains much less carbon monoxide than gas of low calorific value. It is in the interest of public health and safety that the amount of carbon monoxide in city gas should be reduced. To this end the price of gas should be based on the heat unit instead of the cubic foot. Scientific investigation for the development of less poisonous gas deserves liberal financial support.

The hazard to life of automobile exhaust gas in private garages should be

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City gas of high calorific value contains much less carbon monoxide than gas of low calorific value. It is in the interest of public health and safety that the amount of carbon monoxide in city gas should be reduced. To this end the price of gas should be based on the heat unit instead of the cubic foot. Scientific investigation for the development of less poisonous gas deserves liberal financial support.

The hazard to life of automobile exhaust gas in private garages should be

called to public attention by annually repeated warnings, just before cold weather begins. The hazard to health in large garages and in repair shops should be controlled by sanitary regulations actively enforced.

For use in rescues and repairs, the hose mask is safer than the absorbent type of gas mask. Both these types of mask are much safer than self-contained oxygen apparatus.

Pulmotors, lung motors, and other mechanical devices for artificial respiration should be discarded and replaced by general training in the prone pressure method of artificial respiration.

Carbon monoxide combines with the hemoglobin of the blood. It thus excludes oxygen and causes asphyxia. Inhalation of oxygen and carbon dioxide induces a rapid elimination of carbon monoxide. In many other forms of gas poisoning as well, stimulation of breathing by this inhalation accelerates the elimination of the toxic gas or vapor through the lungs.

The victims of carbon monoxide asphyxia should be treated as follows: (*a*) Immediate artificial respiration by the prone pressure method, if respiration has stopped. (*b*) Inhalation of a mixture of oxygen and 5, or better 7, per cent. carbon dioxide—or, if this is not available, oxygen alone—continued until the pulse and temperature are normal. (*c*) Measures to keep the patient warm. (*d*) Prevention of any muscular exertion. (*e*) No transfusion of blood. (*f*) No hypodermic medication.

All rescue crews of the public service corporations and of the fire and police departments, and certainly all hospital ambulances, should be equipped with inhalators.—K. R. D.

THE UNDERWOOD TYPEWRITER AND LEAD POISONING. *Lipkovich. Abstr. as follows from Vestnik Sovreennoï Meditziny, Moscow, July, 1929, in Office internat. d'hyg. pub., Bull. mensuel, Jan., 1930, vol. 22, pp. 166–167.*

The author of this note points out that the cushion upon which the type rests in the Underwood typewriter since 1903 has been made of a fabric bag filled with lead. The continual taps from the type in time wear away the lead and generate harmful dust. An investigation was made at Leningrad in 1928 in several offices. Lead was found present in the air at the level of the mouth of the typist, varying from 0.15 mg. per cubic meter of air at one office, to 0.19 mg. at another, and 0.18 mg. at a third. These amounts are in excess of that found (0.05 mg.) near a linotype machine in a printing factory. Dust collected from beneath a typewriter was found to contain 57 per cent. of lead by weight. When the typists washed their hands in a weak solution of acetic acid, lead was recovered to an amount averaging from 0.33 to 0.59 mg. This amount exceeds that obtained from the hands of printers (0.29 mg.). The typists were found to suffer from sickness, 55 per cent. of them having constipation and abdominal pains, as compared with 19 per cent. for cardboard box makers in the same factory. The hemoglobin content of their blood was 66.7 per cent., as against 72.7 per cent. for the other workers examined. The author ascribes these troubles as possibly due to inhaling lead dust, particularly since the conditions of work and the wages of the typists were better than for the others. He recommends replacing the

cushion filled with lead by a cork cushion covered with velvet.—E. L. C.

EXCRETION OF ZINC IN HEALTH AND DISEASE. *L. T. Fairhall and L. H. Hoyt. Abstr. as follows from Jour. Clin. Investigation, Oct. 20, 1929, vol. 7, p. 537, in Jour. Am. Med. Assn., Nov. 23, 1929, vol. 93, p. 1683.*

An investigation made by Fairhall and Hoyt of the urinary zinc excretion of twenty-four healthy individuals and of forty-one hospital patients showed that while no constant relation could be discovered between zinc output and the degree of anemia, or alteration in hemoglobin, blood cell count, urinary albumin or edema, the zinc output is somewhat different in nephritis and markedly accentuated in uremia and tuberculosis.—K. R. D.

HOW CAN INHALATION OF ZINC OXIDE PRODUCE FEVER? (MECHANISM OF THE CAUSATION OF BRASSFOUNDERS' AGUE). *L. Schmidt-Kehl. Abstr. as follows from Zentralbl. f. Gewerbehyg., Sept., 1928, N. S. vol. 5, pp. 272–273, in Bull. Hyg., Dec., 1929, vol. 4, p. 989.*

[This is one of the contributions in honor of K. B. Lehmann, Professor of Hygiene in the University of Würzburg, on the occasion of his seventieth birthday. Lehmann is justly regarded as one of the greatest pioneers in the elucidation of problems connected with industrial hygiene—especially in the determination of the toxic doses on animals and man of poisonous gases, fumes, and vapors when present in the air. He was the first to produce the ague-like symptoms—malaise, depression, muscular pains, vomiting, and fever which used to be common among brass casters—in man by the inhalation of the fumes of burning zinc alone in a chamber inadequately ventilated. The theory he propounded as probably the cause was that the inhalation of the fumes destroyed epithelial cells in the lining of the respiratory tract and that the absorption of this poisonous dead proteid matter led to the symptoms. Absolute proof of this, however, has been lacking and Schmidt-Kehl has tried to show that it is true.]

The experiment devised by Schmidt-Kehl was to spray germ free rabbit serum into a glass cylinder containing a mist of zinc oxide. The cloudy serum collected was centrifuged to free it of zinc oxide and 20 to 25 c.c. were injected subcutaneously (mostly intravenously) into a healthy rabbit. Control experiments were made with normal serum sprayed in the same way into the glass cylinder without zinc oxide. From two to twelve hours later in the seven experiments made, there was always a rise of temperature when the serum exposed to the zinc oxide was used and never with the controls.

As zinc oxide is soluble in water containing carbonic acid gas, forming zinc bicarbonate, he sprayed this in the same way into the glass cylinder and injected the solution into a rabbit without causing fever. He believes, therefore, that he has shown that proteid matter is necessary to produce the fever and that this points to the accuracy of Lehmann's surmise. An illustration shows at once how the experiment was conducted.—T. M. L.

ACUTE RESPONSE OF GUINEA PIGS TO VAPORS OF SOME NEW COMMERCIAL ORGANIC COMPOUNDS: I. ETHYLENE DICHLORIDE. *R. R. Sayers, W. P.*

Yant, C. P. Waite, and F. A. Patty. U. S. Pub. Health Rep., Jan. 31, 1930, vol. 45, pp. 225–239.

The acute physiologic response of guinea-pigs exposed to air containing ethylene dichloride vapors was determined. The concentrations of vapor and periods of exposure ranged from those which produced death in a few minutes to those that caused no apparent effect after several hours. The symptoms, gross pathology, and fatality are given, together with a brief discussion of potential health hazards.

1. In the order of occurrence, the symptoms produced in guinea-pigs by inhalation of ethylene dichloride vapor are eye and nose irritation, vertigo, static and motor ataxia, retching movements, semiconsciousness and unconsciousness accompanied by uncoordinated movements of the extremities, and death if exposure is continued. Exposure to 6 per cent. vapors causes all these symptoms, excepting death, to occur in less than 10 minutes, and death in about 30 minutes. Exposure to 1 per cent. causes all the symptoms to appear in 25 minutes with the possibility of death occurring a day or more following an exposure of about 15 to 20 minutes. Exposure to 0.12 per cent. did not cause apparent symptoms or death following an exposure of 8 hours. Tables in the report should be consulted for intermediate and additional data.

2. The gross pathologic findings were hyperemia, congestion and edema of the lungs with secondary degenerative changes in the kidneys. The severity of the pathology increased with the concentration of vapor and duration of exposure. The lung lesion was the most prominent and probably the greatest causative factor in death. No serious pathology was found for the following concentrations of vapor and periods of exposure: 6 per cent. for 5 minutes, 1.7 per cent. for 10 minutes, 0.4 per cent. for 30 minutes, 0.2 per cent. for 120 minutes, and 0.11 per cent. for 480 minutes. Also these concentrations and exposures did not cause the death of the animals.

3. The summarized physiologic response given in the four degrees usually reported are: 10 to 20 per cent. kills in a few minutes; 0.4 to 0.6 per cent., dangerous in 30 to 60 minutes; 0.35 per cent. maximum amount for 60 minutes without serious disturbances; 0.1 per cent., slight symptoms after several hours or maximum amount without serious disturbances.

4. A comparison of the results obtained with those reported in the literature for other compounds indicates that for single exposures and periods of an hour or more the toxicity of ethylene dichloride appears to be of about the same order as gasoline, benzene, carbon tetrachloride, and chloroform. For periods of less than an hour it is less toxic than these compounds.

5. The odor of ethylene dichloride is distinct and noticeable, and warning symptoms are produced by relatively safe concentrations.—*Authors' Summary.*

THE ACTION OF HYGIENICALLY AND TECHNOLOGICALLY IMPORTANT GASES AND VAPORS ON THE ORGANISM. THE BROMINE COMPOUNDS OF THE ALIPHATIC HYDROCARBONS. *E. Glaser and S. Frisch. Arch. f. Hyg., 1929, vol. 101, no. 1, pp. 48–64.*

In experiments in which bromine derivatives of the hydrocarbons were injected subcutaneously, tetrabromethane was found to be six times, ethylene bromide to be four times, and methyl bromide to be seven times as poisonous as ethyl bromide. When toxicity was determined by inhalation, tetrabromethane was found to be nontoxic, whereas ethylene bromide and methyl bromide showed a toxicity eight times greater than that of ethyl bromide. Danger from free evaporation (two-phase toxicity) proved to be more than twice as great in the case of ethyl bromide, because of its high volatility, as in the case of the eight times more toxic ethylene bromide. Methyl bromide again was much more dangerous than ethyl bromide, and the greatest precautions should be taken in its use. Prenarcotic doses of ethylene bromide and methyl bromide by inhalation were lethal. In all these substances a higher concentration for a short time could be withstood better than a lower concentration for a longer period. Methyl bromide acted more quickly than ethylene bromide but the toxic effect of the latter persisted longer. (See also Sayers, Yant, *et al.*: Physiological Response Attending Exposure to Vapors of Methyl Bromide, Methyl Chloride, Ethyl Bromide and Ethyl Chloride. U. S. Pub. Health Bull. No. 185, 1929; Abstr. THIS JOUR., 1929, vol. 11, p. 182.)—W. K.

ODOR INTENSITY AND SYMPTOMS PRODUCED BY COMMERCIAL PROPANE, BUTANE, PENTANE, HEXANE, AND HEPTANE VAPOR. *F. A. Patty and W. P. Yant. U. S. Bur. Mines, Rep. Investigations, Serial No. 2979, Dec., 1929, pp. 10 (mimeographed).*

The authors' conclusions are as follows:

The odor intensity and physiological response produced by paraffin hydrocarbon products—propane to heptane, inclusive—were studied from the primary viewpoint of warning-giving properties in event of contamination of air and creation of explosion hazards by accidental leakage. The odor and physiological response were found to increase with increasing number of carbon atoms in the substance (C_3H_8; C_4H_{10}; C_5H_{12}; C_6H_{14}; and C_7H_{16}). The odors of heptane and hexane are easily noticeable in concentrations below their lower inflammable limits. Likewise, heptane and hexane vapors produce distinct symptoms, principally vertigo, after a few minutes' exposure to concentrations below their lower inflammable limits. The odor of pentane is indistinct and that of butane and propane practically absent in lower inflammable limit mixtures. Also, distinct warning symptoms are not produced after several minutes' exposure to hazardous vapor-air mixtures of pentane, butane, and propane.

In the absence of properties which will give warning in event of escape of the vapors, it seems that a warning agent should be added to propane, butane, and similar products contained under pressure which are dispensed for general use as a fuel gas in confined spaces, especially in homes.

—T. F. H.

DUST HAZARDS AND THEIR EFFECTS

REPORT ON EFFECTS OF ASBESTOS DUST ON THE LUNGS AND DUST SUPPRESSION IN THE ASBESTOS INDUSTRY. *E. R. A. Merewether and C. W. Price. H. M. Stationery Office, 1930, pp. 34.*

This report is complement to the article by E. R. A. Merewether which appears in THIS JOURNAL (see May and June, 1930). The article deals with the medical and radiologic data

obtained in the investigation; while the report is concerned with its industrial and technical aspects.

The first part of the report is devoted to the occurrence of pulmonary fibrosis and other pulmonary affections in asbestos workers. The outcome is to establish the existence of a definite occupational risk in the industry. It takes the form of a distinct type of fibrosis of the lungs, resembling silicosis in its main clinical aspects, but differing from that disease in the mode of distribution of the fibrous tissue in the lungs, in its radiologic features, in the enhanced rate of development under average industrial conditions in England, and, as far as the evidence goes, in a lower susceptibility to the supervention of pulmonary tuberculosis.

Asbestos fibrosis results from the inhalation of asbestos dust, the proximate causes being concentration of dust in the air breathed and length of exposure to it; hence the incidence rate is highest in the most dusty processes and among those longest employed. Age and sex have no apparent influence on the production of the disease.

Medical examination of applicants for work, and periodic examinations thereafter are required to eliminate the susceptible and to detect early fibrosis. The majority of the dust particles are in size of the order 2 microns and less, many of which might be caught by an efficient respirator; but respirators are a last resort, not favored by workers and not recommended by the authors. A further rise in the prevalence of asbestosis is anticipated, until safety measures have been adopted for some time, after which the peak should be passed and a steady fall should ensue.

The second part of the report deals with processes giving rise to dust and methods for its suppression. Asbestos is coming to be used more and more for an increasing variety of purposes; but its use for yarn and cloth is its most extensive product in which exposure to dust is most easy to study. The processes for the most part closely resemble those of other textiles; and similar methods of localized exhaust ventilation, particularly for carding engines, are needed to control the escape of dust. Hand mixing of different grades and varieties, incidental to opening processes, is also dusty. In nontextile factories dust is produced in opening, in making insulating mattresses, and in such processes as sawing, grinding, and abrading of asbestos products. All these are described and the danger points are stressed. Owing to the peculiar and harmful effect of asbestos dust, much less dust can be safely tolerated than in comparable industries not using asbestos. The dust is to be controlled by (*a*) localized exhaust draft, (*b*) substitution of mechanical devices for dusty hand work, (*c*) enclosure of dust producing machines, and (*d*) substitution of wet methods for dry. The report concludes with definite recommendations upon which, doubtless, a legal code of regulations will finally be based.—E. L. C.

THE REACTION OF TISSUES TO THE ASBESTOS FIBRE, WITH REFERENCE TO PULMONARY ASBESTOSIS. *S. R. Gloyne. Tubercle, Jan., 1930, pp. 151–153.*

Animal experiments with guinea-

pigs are quoted to demonstrate that asbestos fibers in living tissues act as a benign irritant producing granulation tissue. This tissue contains asbestosis giant cells which are collections of phagocytic polyblastic cells, representing an attempt to destroy the asbestos fibers by phagocytosis. Connective tissue forms in due course; but the giant cells persist. The cytoplasm of the asbestosis giant cells has a pigmented stippled appearance due to the presence of minute asbestos fibers; it is readily distinguished from the true tuberculosis giant cells. No asbestosis bodies were found. No evidence was obtained that asbestos exerts any toxic effect on kidneys, liver, or other organs. —E. L. C.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

A List of Cutaneous Irritants. *L. F. Weber. Arch. Dermat. and Syph., May, 1930, vol. 21, pp. 761–770.*

This valuable list includes all the cutaneous irritants which the author has been able to discover reported in the literature, and is accompanied by a bibliography of sixty-four references. Copies may be obtained by addressing the American Medical Association, 535 North Dearborn Street, Chicago.—M. C. S.

Tests for Detection of Hypersusceptibility to Eczema: Significance for Industrial Medicine. *Bettmann. Abstr. as follows from Deutsch. med. Wchnschr., Jan. 24, 1930, vol. 56, pp. 131–134, in Jour. Am. Med. Assn., April 5, 1930, vol. 94, p. 1104.*

Bettmann points out that some authorities have advocated that, in industries where the employees work with substances that may cause eczema, the susceptibility of the workers to these substances should be tested. In case of a positive reaction, either the worker should be advised to seek other employment or desensitization should be attempted. The author shows that the tests for the detection of hypersusceptibility are still in the experimental stage. He advocates further investigations of this problem. The proportion of the number of persons who actually develop eczema to the number of persons who give a positive reaction in hypersusceptibility tests should be determined. Tests for the detection of hypersusceptibility and desensitization treatments can be considered practical only if it has been proved on a large material that the majority of persons who give positive reactions develop eczema if they are not desensitized, and that those who give negative reactions remain free from eczema.—K. R. D.

Exfoliative Dermatitis Following Occupational Dermatosis. *Arch. Dermat. and Syph., April, 1930, vol. 21, pp. 693–694.*

Dr. Weidman presented the following case:

C. S., a man, aged 42, exhibited a generalized, diffuse erythrodermia with thickening, together with superficial branny exfoliation and numerous excoriations. In addition, there were numerous slightly elevated nodules over the arms and elsewhere. The palms and soles were tremendously hyperkeratotic; on admission, the accumulations were fully a centimeter thick. The hair of the eyebrows was thin from rubbing; the

scalp hair was thin and the scalp itself covered with excessive fine branny desquamation. The tongue was thick, beefy red, and coated. There was general adenopathy.

According to the patient he had had exfoliations at intervals for thirteen years, disappearing in winter and returning in summer. He had been liable to sore throat; his tonsils were removed eight weeks before presentation. He had lost 30 pounds (13.6 kg.) since the previous June but regained some of the weight while in the hospital. He had worked in a flour mill.

A particular incident in this case was the development, about three weeks after he was admitted to the hospital, of a varioliform eruption which appeared particularly over the arms and the upper part of the chest, but also on the legs and face. There were no constitutional symptoms. One of the officers in the hospital thought it might be smallpox, but it was not definite enough to warrant quarantine. I felt that it might be one of the expressions of a leukemia. I have seen a similar varioliform dermatosis in a patient who subsequently died; in addition to this, there was a marked angina with extreme granulocytosis.

In this patient we had to contend with the question of autoinoculation from vaccination, but the inoculation did not take at the site of the primary inoculation. Now that the varioliform lesions have disappeared we see no pittings; the condition was certainly neither variola nor vaccina. (Four weeks after presentation, some very superficial pittings were discernible in the upper part of the arm, but not elsewhere.)

CANCER SUPERVENTION IN SKIN DISEASES. CLINICAL, MICROSCOPIC AND THERAPEUTIC CONSIDERATIONS. *J. J. Eller and N. P. Anderson. Jour. Am. Med. Assn., Feb. 8, 1930, vol. 94, pp. 382–385.*

This article is a summary of the diseases or conditions that are precursors of basal and prickle cell cancers and melanocarcinomas. Among these are the occupational keratodermas due to occupational exposure to various chemicals. These malignant growths, which are usually of the prickle cell types, are invariably preceded by keratoses.

Of the occupational cancers, tar carcinoma is one of the most frequent. Contact with tar may occur among tar distillers, gas works stokers, creosote workers, tar road sprayers, chimney sweepers, paraffin workers, benzine distillers, anthracene laborers, coal oil workers, pitch handlers, lampblack workers, aniline dye workers, and sprinklers of soot (gardeners).

In the group of "arsenical cancer" of occupational origin are included sheep dip workers, who come in contact with much arsenic dust. Arsenical keratoderma and cancer may occur also in workers with Paris green (rat poison), in wall paper makers, in smelters of ores, such as tin, nickel, lead, copper, iron, and silver, in furriers, in tanners, in farmers using arsenic sprays, and in taxidermists.

Other workers in whom keratoses and resulting cancers occur are handlers of heavy grade mineral oils, shale oil workers, mule spinners (scrotal cancer), brewers, and workers with roentgen rays and radium.—K. R. D.

MULTIPLE CARCINOMATA OF SKIN IN A CHIMNEY SWEEP. *W. D. Bedford. Lancet, Feb. 8, 1930, vol. 1, pp. 297–298.*

The patient, who had been a chimney sweep for twenty years, reported at the hospital in June with a tumor which he had had on his lip for three months. A V-shaped excision was done, and the lip healed normally (pathologic report: epithelioma). The patient reappeared at the hospital at the beginning of November, complaining of a similar tumor on the left

side of the scrotum; it had been preceded by an eczematous condition of the skin of the scrotum of varying severity for some months. The tumor was excised and pathologic report showed it to be a growth of the same type as the one previously excised.

EXPERIMENTAL CHROMIUM DERMATITIS. *C. P. McCord, H. G. Higginbotham, and J. C. McGuire. Jour. Am. Med. Assn., April 5, 1930, vol. 94, pp. 1043–1044.*

These authors applied gauze dressings saturated with potassium bichromate, ammonium bichromate, and chromic acid solutions to the arms and forearms of men employed in industries in which chromium may be used. The results led the authors to conclude that these substances in solution may readily produce skin irritation without the necessity of previous skin injury.—K. R. D.

A GENERALIZED, DRY, EXFOLIATIVE DERMATITIS, BECOMING ECZEMATOUS, CAUSED BY USING A CHEMICAL FERTILIZER (CYANAMIDE). *L. M. Pautrier, Gaspart, and Zorn. Bull. Soc. franç. de dermat. et syph., Dec., 1929, vol. 36, pp. 1166–1169.*

After complaining of malaise and headache for a few days a farmer, aged 29, broke out with a rash on the thighs, the bends of the elbows, and the chest. It soon became general over the body; the skin was red, felt harsh, dry and stiff, and eventually peeled off in large flakes. Put upon a vegetable diet, a simple dressing, and intravenous injections of hyposulphite, the man entirely recovered in three weeks. At first the condition was regarded as a drug eruption. Further inquiries elicited the fact that this farmer, working with the same powder in 1923, suffered from a similar rash. He therefore gave up this particular work.

Grégore, the director of the agricultural college for the district, gives the following chemical formula for the reaction of calcium cyanamide when it comes into contact with water:

$$CaNCN + H_2O = NCH_2 + CaO$$

To the liberation of the caustic quicklime has usually been attributed this dermatosis so frequently associated with the handling of this artificial fertilizer. Grégore, however, further says that prolonged contact with water produces the dicyandiamide which is toxic to vegetation. The action of dilute acids, even carbon dioxide, in the atmosphere changes dicyandiamide into dicyandiamidine which is still more toxic. The writers of the article suggest that these further poisons must be taken into account when looking for the actual causes of these eruptions, because this chemical product is in great demand in agriculture. If found to be present and active in sufficient quantity, these new poisons will add a new danger to the use of this fertilizer.—R. P. W.

DERMATITIS VENENATA (SOUR DOUGH). *Arch. Dermat. and Syph., May, 1930, vol. 21, p. 893.*

A man, aged 21, had been a baker for four years, working with sour dough. He presented an itching, scaly, eczematous dermatitis which had started on the right hand five weeks previously. There had been no eruption prior to that. The skin contact

test with sour dough was positive. All other tests with various flours, oils, malt, etc., were negative. The flour did not seem to irritate the skin when dry, but only when mixed in dough form.

ACUTE ECZEMA FROM DYED FURS OF RABBITS. SENSITIZATION. ABSENCE OF ANAPHYLACTIC SHOCK. *Gougerot, Barthélemy, and Cohen. Bull. Soc. franç. de dermat. et syph., Jan., 1930, pp. 115–116.*

A man aged 47 had suffered eight years previously from an acute eczema of the forearms, from an unknown cause. He then found a job in a "skin" factory. In two months' time a rash started on the face and hands. It spread little by little, becoming more widespread and more severe, until he had to leave his work and enter the hospital. The writers consider this to be a case of sensitization to the dye of the fur.—R. P. W.

ACUTE ECZEMA FROM LACQUER. SENSITIZATION. ABSENCE OF HEMOCLASTIC SHOCK. *Gougerot, Barthélemy, and Arnaudet. Bull. Soc. franç. de dermat. et syph., Jan., 1930, p. 116.*

A goldsmith had been working for some six months with Chinese lacquer. A piece of a leaf of the lacquer got attached to one of his elbows and to his wrist. On these parts there appeared five days later an intense erythema. This ultimately turned into a weeping eczema, which covered the face, the upper limbs, and the genital regions. The rest of the body remained free. A piece of lacquer was experimentally applied to the thigh, and brought out a similar type of eruption all round the leg.—R. P. W.

ACUTE ECZEMA FROM SULPHATE OF NICKEL. ABSENCE OF HEMOCLASTIC SHOCK. *Gougerot, Barthélemy, and Arnaudet. Bull. Soc. franç. de dermat. et syph., Jan., 1930, pp. 117–118.*

This patient worked in a nickel plating establishment. In about a fortnight, a dry and fissured eczema broke out on his hands, forearms, and neck. He applied some apparently irritating ointment to the sore parts. This caused the eruption to spread rapidly over the stomach and genital regions. The electrolyte is composed of nickel sulphate and ammonia. This, when applied on a healthy part of the skin, brought out a weeping eczema.—R. P. W.

ACUTE ECZEMA FROM PICRIC ACID. SENSITIZATION. HEMOCLASTIC SHOCK. *Gougerot, Barthélemy, and Cohen. Bull. Soc. franç. de dermat. et syph., Jan., 1930, pp. 114–115.*

A cook aged 57 burned his hand and treated the wound by dressing it with picric acid. As he had about the same time eaten of "peacock," he blamed this meal for causing the swelling of the lips which followed a few hours later. During the next few days the rash developed into an acute eczema of the face and right arm, wherever the picric acid had been applied. The man had previously used picric acid for burns without inconvenience, and was accustomed to eat peacock with impunity. —R. P. W.

A SURVEY OF MINERS' NYSTAGMUS. *H. Lee. Abstr. as follows from Tr. Ophth. Soc. United Kingdom, 1928, vol. 48, p. 429, in Am. Jour. Ophth., Feb., 1930, vol. 13, p. 171.*

The author presents figures to show the frequency of the condition in various coal mining sections of England and Wales. He then mentions the various theories which have been advanced in the past to explain it. These are (1) postural, (2) deficient illumination, (3) infective, (4) poisonous gases, (5) predisposition or heredity. The author's own theory coincides with that of Snell, in that he believes the nystagmus is essentially a local ocular condition, due to work carried on in deficient illumination, associated with unnatural or constrained position of the eyes. Further, he believes the condition only becomes a disability to the miner when present in an individual whose central nervous system is unstable.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

THE ORGANIZATION AND CONDUCT OF A PLANT MEDICAL DEPARTMENT. *B. J. Slater. Hosp. Management, Dec., 1928, vol. 26, pp. 60–62.*

A medical department should be organized with sufficient equipment to make a thorough study of any case requiring treatment. It should have a small laboratory where blood counts can be done; an X-ray laboratory where X-rays of teeth and chests may be readily available. As a general rule it should be the policy of the medical department to examine all people who have been absent for a period of over three weeks. The medical department should co-operate with other departments, particularly the safety department, but should limit its efforts to medical interests. It should be run on the basis of a kindly sympathy for those who need its services, and should be eternally on the job and should have an adequate follow-up system in operation. Illustrations of special procedures are drawn from the experience of the Eastman Kodak Company, of Rochester, N. Y.

SURGEONS' GROUP INVESTIGATES MEDICAL CARE IN CHICAGO PLANTS. *Hosp. Management, Oct., 1929, vol. 28, pp. 68, 70.*

This is a summary of the findings in a detailed study conducted in selected industries in the Chicago area by the American College of Surgeons.

The prevailing plan of organization places the administration of the medical service under one of the other main divisions. This plan is inefficient; the medical department should constitute one of the main divisions of the organization and be operated under the supervision of a medical officer with administrative responsibility.

Extreme variations in facilities and scope of service exist. Complete units provide active medical and surgical service, including facilities for diagnosis and health education; limited units provide only for the treatment of injuries and minor illnesses; and minimal units are confined to the treatment of minor injuries. Maximum absenteeism due to illness and injury is the result of minimal facilities and service.

The scope of the physicians' work in the majority of industries does not extend beyond the care of injuries. In a small percentage of industries it includes the direction of health measures,

physical examinations, and supervising attention to the treatment of physical defects, in addition to the treatment of injuries. Results of this extended service show a decrease in compensation costs. The majority of industries have been slow to adopt preemployment and periodic examinations.

To raise the standards of medicine and surgery in industry there should be improvement in the environment of the physician. This means (1) a solution of disturbing economic problems, (2) the administration of medical matters by medically trained persons, and (3) the establishment of a closer relationship between the physicians and the industries.

The Industrial Commission is alleged to give too much consideration to opinions rendered by professional medical testifiers rather than by practical surgeons. There is a need for the Commission to have nonpartisan medical opinions based on complete and accurate clinical findings. In order to meet this need it has been recommended that a medical adviser above reproach be appointed to consult with the Commission on cases with complicated medical questions.—E. D.

118 Full-Time Physicians and Surgeons Care for Pennsylvania Employees. *R. V. Massey. Hosp. Management, Nov., 1929, vol. 28, pp. 68, 70.*

The medical department of the Pennsylvania Railroad has under its supervision and scattered through all parts of the railroad system 118 physicians and surgeons, who devote their entire time to employees requiring treatment. The physicians are stationed at important centers, and connected with each office is a dispensary where employees may secure free treatment for both accidents and sickness. Emergency supplies are available for immediate use at strategic points, and fully equipped first aid cabinets have been placed in many locations. At other points, such as yards, shops, and transfers, a complete first aid room is in operation. First aid boxes are carried in baggage cars and cabin cars, and are available at other points where any number of men are employed. Employees in train service, in shops, in yards, and in the maintenance-of-way department, including foremen, receive first aid instructions to enable them to act promptly and properly in cases of emergency.

In addition to the regular medical force, the Railroad retains the services of a staff of outstanding specialists in practically every disease and every branch of surgery. In connection with the operation of the relief department rehabilitation service is maintained. If it is not possible to return a disabled employee to his former occupation, the rehabilitation bureau finds a suitable position for him, so that he can be self-supporting.

The author believes that the medical work which the Pennsylvania Railroad is maintaining "has demonstrated its economic value, the full extent of which cannot, of course, be measured merely by dollars and cents. . . . . As business grows more complex and intense, the physician in industry will necessarily become a more valuable assistant in the management of our railroad."—E. D.

An Inquiry into the Physical Conditions of Indian Labour. (A

PRELIMINARY COMMUNICATION.) *P. V. Gharpure and S. G. Latey. Indian Med. Gaz., 1929, vol. 64, pp. 673–677.*

In connection with a realignment scheme undertaken by Messrs. Tata Construction Company, a large labor camp was formed at Khandala village. The authors used this opportunity for examining some 800 laborers coming from various parts of India. The data so collected were divided according to place of origin: thus, Pathans from the Frontier; Northern Indians from the Punjab, United Provinces, and Central India; Marathas from the Bombay Presidency; Southern Indians from Madras Presidency and Mysore; and Makranis from Baluchistan and surrounding areas.

Examination of the data disclosed that in the south the average adult male is both thinner and shorter than men from the north, those coming from the Bombay Presidency being the poorest specimens. Some men examined were fine instances of well-developed manhood, over 6 feet in height with proportionate weight. Height, weight, and chest measurement were found to increase with age, up to the age of 30, after which both height and chest measurement diminished. Difficulty was found in examining the special senses, owing to impossibility of making those examined understand the questions. Malaria incidence based on splenic enlargement and blood examination varied considerably, from 4 per cent. among the Pathans and 39 per cent. among the Marathas, to 15.5 per cent. among the Makranis and 13.8 per cent. among the Northern Indians. Skin diseases were present in 19 per cent. of the Marathas but in only 3.3 per cent. of the Makranis.—E. L. C.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

REPORT ON INVESTIGATION IN THE COALFIELD OF SOUTH WALES AND MONMOUTH. *A. B. Lowry and J. Pearse. H. M. Stationery Office, 1929, pp. 10.*

The opportunity was taken of a situation on the South Wales coal field with unemployment, due to industrial depression, without parallel in the modern history of Britain, to investigate the consequences. Efforts made to measure the effect on health, by appeal to vital statistics, were, unexpectedly, without result. Facts and figures are quoted to show that the general death rate had not risen; nor had infant mortality, nor the incidence of tuberculosis which are both held to react delicately to malnutrition. Yet the diet was found to be inadequate and insufficient in protein, mineral salts, and vitamins. The only definite indication disclosed was an increase in rickets, and, in some areas, in languor and anemia among young women. A less tangible result of the burden of idleness was its destructive effect on character and morale, to remedy which work was needed rather than food or clothing. The disclosure that idleness disturbs mentality quicker than want affects health is one of no small social import.—E. L. C.

CONDITIONS OF WORK IN SPIN ROOMS. PART I. THE EFFECT OF A CHANGE OF METHOD IN THE SPIN ROOM ON ABSENCE AND TURNOVER

AMONG WOMEN OPERATIVES. PART II. TEMPERATURE READINGS IN FIFTEEN MILLS. *E. L. Best. U. S. Dept. Labor, Women's Bur., Bull. No. 72, 1929, pp. 39.*

A division of labor was tried out in four cotton mills with quite satisfactory results from the point of view of the employer since the cost of production was somewhat reduced. The data on absence and turnover, however, although not entirely conclusive, would seem to indicate dissatisfaction among the workers or reluctance to change their method of work.

Temperature and humidity readings in the mills showed that atmospheric conditions were far from ideal. About 55 per cent. of all dry bulb temperatures were between 75° and 85°F., while five times as many readings were 85° and over as were less than 75°. More than one-fourth of the records showed relative humidities between 60 and 70 per cent., about one-fifth were 70 per cent. and over, and the remainder were below 60 per cent.

Two-fifths of the readings in the southern mills were found to be 85°F. or over, as compared with one-third of the readings in the northern mills. Sustained temperatures of 80°F. and more during entire working days were recorded on three-fifths of the days in the southern mills, as compared with one-third in the northern mills.

This report shows clearly that little is being done to regulate the temperature and humidity of cotton mills in the interest of the health and efficiency of the workers. The problem is not difficult to solve in its engineering aspects, but the cost of installing air conditioning equipment which will maintain proper atmospheric conditions is considerable and may prove prohibitive, especially in the case of the small mills.—C. P. Y.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

MINERS' WELFARE FUND. EIGHTH ANNUAL REPORT, FOR THE YEAR 1929. *H. M. Stationery Office, 1930, pp. 73.*

An account is given of another year of administration of this fund, which now reaches more than one million sterling per annum. As usual much expenditure was upon various recreation schemes, attention being drawn to a few of the more notable. One included an area of $2\frac{1}{2}$ acres devoted to the most modern ideas for a children's playground; it is intended as an example and incentive to the development of other similar schemes. A series of excellent illustrations shows what is being done in the way of institutes, pavilions, recreation grounds, and swimming baths. Grants directly connected with health have absorbed considerable allocations for convalescent homes, hospitals, ambulance services, and nursing schemes. Here a convalescent home for Durham miners looks particularly attractive. Education for miners and their families has continued to receive support, and a special section is devoted to an account of help given through a scholarship fund established to enable mining can-

didates to receive education at any university, even Oxford or Cambridge, without being financially embarrassed.

This year interest centers rather upon pit welfare in connection with the development of pithead baths, and also pithead canteens. The latter have become a part of almost every pithead bath installation, but are being found a success on their own account. Steady progress in the construction of pithead baths is reported, and today bathing accommodation exists for over 60,000 miners. A few years ago there was not accommodation for 6,000. The cost of construction varies, being less per head as the numbers are greater; but the average cost during the year was just under £11. Similar variations are to be found in the charges made to the miners, which are required for maintenance; here, however, the figure seldom exceeds sixpence per week. The plan adopted for construction seems now to have become fixed, although improvements continue to be made. Each miner has a locker for his outside clothes in one part of the building, and another locker for his pit clothes in another portion of the building. The bathing accommodation usually is placed between these two sections. Provision is made for boot cleaning by mechanically actuated brushes, for filling water bottles, and for first aid, in connection with bath structure. Clearly the British miner, even though he has had to wait, is soon to be provided with distinctly better bathing accommodation than are his fellows in other countries.—E. L. C.

GOODYEAR EMPLOYE HOSPITAL PLAN WORKS TO SATISFACTION OF ALL. *G. C. Capps. Hosp. Management, Dec., 1929, vol. 28, pp. 66, 68, 70.*

The Goodyear Hospital Association is an employee benefit association group which has for its purpose the defraying of certain hospital expenses for its members. Every member pays $1 entrance fee to help defray the overhead cost of organization and operation. Dues of $1.25 quarterly, payable in advance, are charged, in return for which members are entitled to the following benefits when it is necessary for them to be admitted to any hospital for nonvocational sickness or injury—incidental fees such as operating room fees, laboratory fees, emergency fees, X-ray fees, and $3 a day toward room and board. The patient is entitled to a maximum of $250 for any one disability or in any fifty-two consecutive weeks.

From August 17 to December 31, 1927, the Association serviced 236 hospital cases, at an expense of approximately $5,500. During 1928, 818 members were hospitalized, or an average of sixty-eight per month, at an expense of $29,000. For the first nine months of 1929, approximately $35,000 was expended for the care of 985 cases. The membership has fluctuated from about 12,000 to over 18,000, and the income has exceeded the amount paid out for benefits and operating expenses by $97,000. This surplus is considered sufficient to meet the needs in any epidemic or unusual situation, and the Association is now considering the expansion of its work.—E. D.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

THIRTY YEARS' EXPERIENCE OF INDUSTRIAL MALADIES. SHAW LECTURES. *T. M. Legge. London, Royal Society of Arts, 1929, pp. 51.*

These three lectures deal with (1) notification of industrial diseases in Great Britain, (2) lead poisoning, and (3) compensation for industrial diseases. The author explains that, after notification of certain industrial diseases was demanded by law, he was appointed in 1898 as the first medical inspector of factories. At that time, the diseases which had to be notified were anthrax, and poisoning by lead, phosphorus, and arsenic. Later mercurial poisoning was added, and during the War, toxic jaundice. This was followed by epitheliomatous ulceration due to such substances as tar and pitch, and by chrome ulceration; finally poisoning by carbon bisulphide, aniline, and benzol were placed on the list. The information so obtained led to supervision of the places where the diseases were occurring and gave opportunities for intensive inquiries.

Dr. Legge shows how these inquiries have resulted in precautionary measures. In establishing these, however, the employer first must be called on to do everything possible, since it is only by bringing influence to bear external to the workmen that success can be achieved. Work with poisonous products must be foolproof, if the worker is never to be poisoned. The best precaution is removal of the hazard, as occurred when the use of yellow phosphorus for making matches was abolished, and when mercury was given up for backing mirrors. The fight against anthrax is summarized. This has resulted in the control of woolsorters' disease by disinfecting all suspicious wool as it arrives in Great Britain at Liverpool. The almost phenomenal rise in knowledge concerning skin cancer in industry during the last eight or nine years is ascribed to recognition that mineral oil used for lubricating spinning machines in the cotton trade possesses carcinogenic characteristics. Information which was gathered through notifications is given regarding each of the diseases now listed.

The second lecture is wisely devoted entirely to consideration of the occurrence of lead poisoning in industry. This subject must always be associated with the name of the author of these lectures. He it was who recognized that lead poisoning occurs first and foremost by inhaling lead dust, and that, compared with this path of entry, other lead hazards, such as swallowing lead with food, are quite inconsiderable. Further, he has placed the threshold dose of lead dust at 2 mg., *i.e.*, 1/32 of a grain, absorbed daily, below which chronic lead poisoning does not originate in industry. He shows how lead poisoning in different industries has been brought under control in direct proportion to the way in which the lead hazard can be controlled by minimizing the amount of lead dust in the air. Success has been most definite in the white lead industry and in the manufacture of pottery. On the other hand, in the smelting of lead and the use of paints, less success has followed because the hazard has been more difficult to control. This

difficulty rules particularly in the house painting industry, where prohibition of the use of lead in paints seems to be the only way of protecting the painter. Dr. Legge expresses his regrets that Great Britain in this matter has not adopted the Geneva Convention of 1921. Records are quoted to show that, during the thirty years under review, the severity of notified cases of lead poisoning has been steadily diminishing; thus whereas from 1900 to 1904, 33.2 per cent. of the male and 24.3 per cent. of the female cases were described as severe, in 1920 to 1924 the percentages were only 14.3 for males and 9.9 for females. The most distinctive symptom of severity is encephalopathy, which claimed in 1900 to 1904 for males 3.7 per cent. of notified cases, and for females 8 per cent.; these figures had fallen in 1920 to 1924 to 1.1 for males and 2.1 for females.

The opinion is expressed that in addition to nerve paralysis in the chronic cases there is a definite weakness of muscles due to lead absorption. This weakness manifests itself more in the muscles commonly used than in the others; thus for a right-handed person exposed to lead absorption the right arm becomes less powerful than the left. Once a state of lead poisoning has been established, definite damage is done to the body which cannot be cured. It can only be treated and relieved. Lead poisoning must be prevented since it cannot be cured.

In the third lecture Dr. Legge shows that the notification of industrial diseases inevitably led to the granting of compensation for illness so caused. This occurred in 1906 when twenty-five occupational diseases were scheduled under the Workmen's Compensation Act which formerly had included only accidents. Today thirty-three diseases have been scheduled as compensable. In order to be scheduled, the disease must originate from occupation and be outside the category of an accident; it must incapacitate for more than a week; and it must be so specific to the employment that causation by the employment can be established in individual cases. Poisoning by such gases as carbon monoxide and sulphuretted hydrogen, which overcome immediately, are considered to be accidents and therefore are not included in the schedule. They differ from the slow type of poisoning which may result from nitrous fumes, carbon bisulphide, or benzol poisoning. On the other hand brassfounders' ague does not incapacitate for a week, and so is not scheduled; while boiler makers' deafness, trying as it is, causes no incapacity at all. In several cases the existence of occupational disease was revealed by Trade Union secretaries, as in the case of glassworkers' cataract, epitheliomatous ulceration, and poisoning from African boxwood. Today the maladies of coal miners constitute over 90 per cent. of all compensated occupational diseases, and of these nystagmus stands easily first. The lecturer tells how he detected posterior cortical cataract in glass bottle finishers, which is caused by the heat rays from molten glass. This type of cataract has since been found among men working before hot furnaces. Sir William Crookes devised a glass which cuts off 90 per cent. of the heat rays from the eye when used as spectacles; but workers cannot be persuaded to use them.

The lectures close with a consideration of silicosis as a compensation disease, since the provisions of the Act have been widely extended for this disease in Great Britain during the course of the last eighteen months; and the opinion is expressed that asbestosis also will have to be treated in the same way for compensation purposes. Finally a regret is expressed that the appointment of a medical inspector of mines did not take place until recently.—E. L. C.

SILICOSIS (MEDICAL ARRANGEMENTS) COMMITTEE. REPORT OF THE DEPARTMENTAL COMMITTEE APPOINTED BY THE SECRETARY OF STATE TO ADVISE AS TO THE MEDICAL ARRANGEMENTS WHICH COULD BE MADE FOR THE DIAGNOSIS OF SILICOSIS. *J. C. Bridge, F. J. H. Coutts, and A. J. Hall. H. M. Stationery Office, 1929, pp. 19.*

Recent wide extension, in Great Britain, of the right to compensation on account of silicosis to practically every industry in which a silica dust hazard exists has raised administrative difficulties relating to diagnosis. The industries included now comprise the refractories industries, getting and working sandstone, metal grinding on sandstone wheels, pottery making, stone masonry, tin mining, the granite trade, monumental masonry, rock drilling in coal mines, fettling in foundries, road paving, and making silica flour for scouring powders and silica paints; while the disease may also occur in industries and occupations where its presence has not yet been suspected. These trades are scattered throughout every town and village in the land and find employment for between 50,000 and 100,000 men. By way of comparison, the South African gold mining industry—so famous for the occurrence and control of silicosis—is localized on the Rand reef and employs some 10,000 white miners.

The departmental committee issuing this report holds that the workers should, as in South Africa and also in the small refractories industries, be medically examined on engagement and thereafter periodically by whole time experts. For this purpose a number of peripatetic boards, composed each of two experts, should be stationed in various places, whence they would travel in the neighborhood to carry out examinations at factories, quarries, or mines. Efficient radiographic services are essential and may possibly be provided by mobile installations with expert radiologists traveling by road to remote districts. The medical boards would carry out post-mortem examinations and decide on the findings. No appeal from the decisions of the boards is contemplated. But their work would be linked up by a chief medical officer at a central bureau for standardization and research, situated at Sheffield. Such a bureau would undertake pathologic and experimental investigations which are greatly needed to explain the action of silica on the tissues and the factors influencing long latency or rapid development. The whole Scheme is a practicable, although perhaps costly, method for controlling silicosis; but control of silicosis becomes worth while when it lessens the cost of compensation.—E. L. C.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

HYGIENE IN INDUSTRY. *W. L. Hichens. Jour. Roy. San. Inst., Nov., 1929, vol. 50, pp. 324–328.*

Modern civilization recognizes a right to healthy conditions at home and at work. The home and the factory react each on the other. The health and efficiency of workers, although complex to attain, are of great importance. The optimum spell for activity, the elimination of boring monotony, and the invention of labor saving devices render toil less exhausting and productivity more bountiful. Ventilation calls for study at process after process; and illumination needs continuously to be improved. Further, the psychology, as well as the physiology, of the worker is a subject for research and for careful attention. Today in Great Britain progress is being attained through the activities of the Industrial Health Research Board, the National Institute of Industrial Psychology, the Industrial Welfare Society, and, lastly, employers and workers who put into practice the findings of the scientists, the whole being carefully supervised by the Home Office. The organization has grown up, quite unplanned; but it is effective and deserves every support from industry.—E. L. C.

BAKERIES. *E. C. Bell. Jour. Roy. San. Inst., Nov., 1929, vol. 50, pp. 318–322.*

A short but interesting account is given of the origin of the ancient occupation of baking. It may have started in India. The Egyptians discovered the value of fermenting dough; and their priests prepared and stocked a ferment. They taught the Hebrews, who distinguished leavened from unleavened bread. The dough was kneaded by the feet. The Romans had flour mills and ovens. But perpetual ovens and dough machinery are quite modern innovations. Electricity is now being used for heating ovens, as well as for irradiating dough with ultraviolet rays; it eliminates dust and dirt, and also fumes which escape from fuel fired ovens.—E. L. C.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

LEUKEMIA FOLLOWING TRAUMA. *S. C. Lewsen. Abstr. as follows from Lancet, Feb. 8, 1930, vol. 1, p. 288, in Jour. Am. Med. Assn., April 5, 1930, vol. 94, p. 1100.*

In the case reported by Lewsen it seemed that an injury of the crest of the tibia might have been an etiologic factor in the condition. The patient's health before the accidents was absolutely beyond suspicion, and in the absence of any symptoms, however slight, it is difficult to believe that he had leukemia before the first blow. Admittedly, however, absence of the illness could have been indisputably established only by a full physical examination, including an estimate of the size of the spleen and a blood survey immediately before the trauma. It is equally true that no such examination was ever necessary on account of his excellent health. Forty cases are tabulated. The literature contains about sixty cases in all, but the evidence for the remainder is unconvincing. It appears from the table that the great majority of the patients are males (twenty-seven out of thirty-one). The average age is 38. No history of familial tendency is found, and the personal history is usually clear. A history of malaria is recorded in two cases. The type of trauma may be classified as (*a*) a blow to the long bones or ribs which may or may not result in a fracture; (*b*) a blow in the region of the spleen, sometimes rupturing that organ; (*c*) a general severe shaking. The trauma may be repeated. In two cases symptoms of leukemia developed after the third injury, and in another case leukemia developed after the first blow, the second blow causing an exacerbation which resulted in death three weeks afterward. The diagnosis was established from a few days to four years after the injury. The leukemia was always of the myeloid variety except in one doubtful instance. Death followed in twenty-two cases, from three weeks to five years after the trauma (or last trauma). Pain over the site of the trauma was a feature in many cases, often throughout the course of the illness.—K. R. D.

ROENTGEN INJURIES OF GERM CELLS AND OFFSPRING OF MALE ROENTGENOLOGISTS. *L. Loeffler. Abstr.*

as follows from Strahlentherapie, Dec. 28, 1929, vol. 34, p. 735, in Jour. Am. Med. Assn., March 29, 1930, vol. 94, p. 1027.

Of 110 roentgenologists who replied to a questionnaire sent to them by Loeffler, microscopically demonstrable injuries of the spermatozoa were present in twenty (18 per cent.). The number of abortions in the wives of the roentgenologists was small (one abortion to eleven normal childbirths). The average number of their children was 1.5. These facts confirm the author's belief that the phenotypic appearance of hereditary injuries occurs only in later generations.—K. R. D.

INJURIES TO WORKING WOMEN WITH SPECIAL REFERENCE TO THEIR EFFECT ON PROPAGATION OF THE RACE, AND MEANS OF PREVENTION. *H. Küstner. Leipzig, Johann Ambrosius Barth, 1930, pp. 124.*

Reviewed as follows in Jour. Am. Med. Assn., Feb. 22, 1930, vol. 94, p. 585.

During the last decade a large number of women have been employed in various occupational fields. This condition has had a definite effect on the health and well-being of the women thus employed. The author points out how important it is not only for physicians but also for political economists and others to realize that much harm is being done to these women from the point of view of propagation of the race. He discusses the effect of employment in general, and of certain industries in particular, on the genital tract. He likewise considers the effect of industry on pregnancy and labor in these women. The last part of the book is devoted to means of diminishing the harm suffered by this class of women. Many of the problems taken up by the author are indigenous to Germany and do not arise in our country. Nevertheless this booklet should prove of interest not only to American physicians but also to public health officials, economists, and clergymen.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

SOME TYPES OF INDUSTRIAL POISONING. *Consumers' League of Massachusetts, July, 1929, pp. 44.*

This report presents the findings in a survey made by the Consumers' League of Massachusetts, during June, July, and August, 1928, of the hazards in some Massachusetts industries where women handle poisonous materials. Fifty-five factories in the leather, shoe, rubber, candy, and a few miscellaneous industries were visited.

Women were found to be exposed to poisonous substances in three of the industries: in the leather industry—to chemicals, such as benzol, methyl alcohol, and amyl acetate, contained in the lacquers, pigments, and finishes; in the boot and shoe industry—to naphtha rubber cement, benzol cement, methyl alcohol, ether, and certain repairing dopes; and in the rubber industry—to benzol and naphtha rubber cement, often containing carbon tetrachloride to prevent inflammability, fumes from bromine (used sometimes to give a shiny finish to rubber fabrics), carbon disulphide, and sul-

phur chloride (used in vulcanizing processes). In one clock and watch factory women were exposed to fumes from cyanide potassium, nitric acid, sulphuric acid, hydrochloric acid, arseniuretted hydrogen, amyl acetate, chromium, benzol, and radium dust. According to an analysis made at the time of the New Jersey radium poisoning publicity, the radium used contained zinc oxide but no mesothorium, and had been pronounced not injurious. The girls were, however, instructed never to point their brushes in their mouths, and each girl was provided with a glass case under which to mix the radium paint.

On the basis of its findings, the League recommends: the establishment of a Division of Industrial Hygiene, in the State Department of Labor and Industries; reestablishment, with adequate standards, of the position of Industrial Health Inspector in the Personnel Classification Service; adoption of an industrial code regulating the use of benzol in industrial establishments; required medical supervision in all factories where workers are exposed to poisonous substances, with periodic physical examinations and blood tests of workers exposed to benzol; establishment of industrial clinics in hospitals and dispensaries in industrial centers; more intensive and extensive research in the field of industrial hygiene; and more comprehensive study of industrial health conditions throughout the country by such federal agencies as the Women's Bureau, Bureau of Labor Statistics, and the Public Health Service.—E. D.

Mine Rescue Apparatus: The S. M. R. B. Gas Mask. *S. H. Katz and C. S. W. Grice. Safety in Mines Res. Board, Paper No. 57, pp. 37. H. M. Stationery Office, 1930.*

The work described in this paper is an instance of research carried out at Sheffield by the Safety in Mines Research Board in co-operation with the United States Bureau of Mines. The object was to develop a gas mask which would protect against abnormal mine atmospheres in which a flame safety lamp will remain alight. The apparatus consists of a facepiece connected with an absorbent canister. The use of a facepiece obviates a nose clip and mouthpiece. Eyepieces are provided, which are kept from fogging by directing over them dry incoming air. All air entering the facepiece must traverse the canister, which has been developed on lines devised in America; but the materials are arranged in thinner layers in order to offer less resistance. In use the resistance against an air flow of 85 liters per minute is about 1.8 inches of water, as compared with 4 to 5 inches in earlier types of gas masks. Air entering the canister first encounters activated charcoal, which removes organic vapors and small percentages of hydrogen sulphide. Next it encounters a granular caustic soda preparation which absorbs all poisonous acid gases. Then it meets a filter of absorbent cotton wool which removes smoke. Silica gel comes next; it removes ammonia and supplements the action of the activated charcoal. Then comes a layer of calcium chloride for removing all water vapor; after which the air passes through hopcalite, a mixture of 60 per cent. manganese dioxide and 40 per cent. copper oxide, which causes carbon monoxide, by uniting with the oxygen of the air, to form carbon dioxide. Another layer

of calcium chloride guards the hopcalite from moisture; and finally there is a second layer of absorbent cotton wool.

Laboratory tests are described in which the efficacy of the canister was demonstrated for restraining chlorine, sulphur dioxide, ammonia, carbon tetrachloride and carbon monoxide introduced into the air in varying concentrations. Further, the complete masks were worn by investigators remaining for periods of thirty minutes in different atmospheres containing 1 per cent. sulphur dioxide, carbon tetrachloride, and carbon monoxide, and a 2 per cent. concentration of ammonia, and dense smoke. A considerable amount of physical work was performed in order to stimulate breathing; but no discomfort, either from noxious fumes or from resistance to breathing, was noticed at any time. The authors consider that such masks, in addition to their use in mines, may form adequate protection against poisonous gases, vapors, and smoke for fire brigades and other workers likely to encounter gas hazards.—E. L. C.

Advanced Mine Rescue Training. Part I. Mine Gases and Methods for their Detection. *J. J. Forbes and G. W. Grove. U. S. Bur. Mines, Miners' Circ. 33, 1929, pp. 65.*

Advanced Mine Rescue Training. Part II. Instructions in Methods of Sampling and in the Use of the Bureau of Mines Portable Orsat Apparatus for Analyzing Mine Gases. *W. P. Yant and L. B. Berger. U. S. Bur. Mines, Miners' Circ. 34, 1929, pp. 89.*

Use of a Type N Miners' Gas Mask. *S. H. Katz and G. S. McCaa. U. S. Bur. Mines, Miners' Circ. 32, 1929, pp. 29.*

This circular describes the gases found in mines and the All-Service (type N) gas mask, tells of the care the gas mask should receive, and outlines the organization and methods under which crews equipped with gas masks should operate in mines.

The All-Service gas mask is specially designed to be used in atmospheres containing any irrespirable gas and at least 16½ per cent. of oxygen.—C. E. B.

Explosive Limits of Industrial Gases. *J. Yeaw. Abstr. as follows from Indust. and Engin. Chem., Nov., 1929, vol. 21, pp. 1030–1033, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 727.*

The limits have been redetermined for a considerable number of gases and these data used in testing the validity of Le Chatelier's formula as amplified and developed by Coward, Jones, and others. This formula is approved as a means of determining dangerous conditions such as may arise in the production and distribution of city gas.

Investigation by Means of Diffusion Studies of Protection against Fire and Explosions in Tunnels. *A. Ringel. Abstr. as follows from Gesundh.-Ing., 1929, vol. 52, p. 759, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 501.*

Analyses of gas from tunnels were made. Explosion zones with different types and ratios of gases are shown. The poisonous and explosive concentrations of carbon dioxide, carbon monoxide, hydrogen sulphide, chlorine, nitric oxide, hydrogen, acetylene, ben-

zene, and methane are given. Studies were made of the rates of diffusion of the gases in tunnels.

DANGER TO HEALTH AND FIRE HAZARDS OF THE SPRAY PROCESS OF PAINTING. *Wilcke. Abstr. as follows from Zentralbl. f. Gewerbehyg., March, 1929, N. S. vol. 6, pp. 82–86; Chim. et indust., vol. 22, p. 498, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 736.*

The best protection for the workmen consists of a mask, the one recommended having the advantage of being light, small, of simple construction, and fitting the face closely while leaving the forehead free and in no way interfering with the movements of the workmen. From a systematic investigation carried out in a closed chamber inside which an electric spark could be produced, Wilcke concludes that the fire hazards by the spraying process are no greater than those by the brush process of painting.—P. D.

HAND AND FINGER INJURIES CAUSED BY ANILINE DYE PENCILS. *A. Buzzi, A. J. Costa, and M. N. Derqui. Abstr. as follows from Semana méd., 1929, vol. 36, pp. 1064–1068, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 426.*

A case history.

METHOD OF DETERMINATION OF ARSENIC ADAPTED TO THE STUDY OF ARSENICAL PRODUCTS IN THE ORGANISM. *A. Berat. Abstr. as follows from Jour. de pharm. et de chim., 1929, vol. 10, pp. 49–69, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 639.*

The method, a selective adaptation of previous methods, consists in oxidizing the organic substance with concentrated nitric acid, then treating successively with concentrated sulphuric acid, potassium permanganate, and hydrogen peroxide, evaporating at a temperature not above 105°, then distilling arsenic as arsenic trichloride by a current of hydrochloric acid in a reducing atmosphere, *i.e.*, of sulphur dioxide. After accurately neutralizing the distillate with 40 per cent. sodium hydroxide solution, determine arsenic as usual by titration with 0.1 normal or 0.01 normal iodine in sodium bicarbonate solution. With proportional quantities of arsenous oxide (with or without addition of organic matter), or of arsebenyl, sulpharsenol, metarsenobenzene, rhodarsan, tryparsamide, tryponarsyl, atoxyl, and arsylene, the method returned proportional quantities of arsenic (in terms of cubic centimeters of iodine solution) represented in graphs by straight lines. Exceptions were noted with *arrhenal* and *sodium* and *manganese cacodylate*, these having more or less *resisted oxidation*. Determination of percentage of arsenic by this method agreed well with the results by other authors on the same arsenic compounds. A list of twenty-three references is given.

RAYNAUD'S DISEASE ASSOCIATED WITH CHRONIC ARSENICAL RETENTION. REPORT OF CASE CURED BY SODIUM THIOSULPHATE. *A. F. Kraetzer. Jour. Am. Med. Assn., April 5, 1930, vol. 94, pp. 1035–1037.*

Kraetzer reports a case of Raynaud's disease in a patient—a greenhouse worker—who had been exposed to arsenical insecticides over a long period. Well-known symptoms of chronic arsenical poisoning were present—recurrent eczema, waxy pallor, injection of the tarsal conjunctivae, and

garlic odor of the sweat—and arsenic was demonstrated quantitatively in the urine. Under sodium thiosulphate treatment, there was progressive improvement and finally complete disappearance of symptoms.

Arsenic is a frequent contamination of many articles used for food and other purposes, and, in Kraetzer's opinion, should be searched for as possible etiologic factor in other cases of Raynaud's disease.—K. R. D.

SHEEP-DIPPING AND THE SHEPHERD. *I. W. Hall and R. H. Ellis. Lancet, March 1, 1930, vol. 1, pp. 448–450.*

A case is reported in which the cause of death of a shepherd was suspected to have been at least accelerated by absorbing arsenic through contact with sheep dip. These dips contain about 20 per cent. of arsenous oxide; and the solutions, when prepared for the sheep, contain 0.2 per cent. of soluble arsenic. Practitioners in rural areas are acquainted with troubles due to the absorption of arsenic during sheep dipping. In the case reported, in which a careful postmortem examination was made, symptoms indistinguishable from arsenical poisoning were present; but death was proved to be due to an infection by aertrycke bacilli. A sheep dog died from the same cause. Traces of arsenic were found in the body, particularly in the liver; but if the bacillary infection had not intervened probably the arsenic would have been eliminated in time.—E. L. C.

DISTRIBUTION OF ARSENIC IN THE BODY AFTER A FATAL CASE OF POISONING BY HYDROGEN ARSENIDE. *F. J. T. Grigg. Abstr. as follows from Analyst, 1929, vol. 54, pp. 659–660, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 319.*

The poisoning took place during the recovery of gold by the cyanide process when the zinc slimes were treated with sulphuric acid. The Reinsch test showed the following milligrams per kilogram: brain 1.4, 1.0; lungs 2.59, 2.3; stomach and contents 0.1, 0.3; spleen 0.48, 2.2; kidney 0.36, 1.3; liver 6.9, 4.4.

THE TOXICOLOGY OF BENZINE. *N. W. Lazarew. Arch. f. Hyg., Oct., 1929, vol. 102, pp. 227–239.*

The author has arrived at the following conclusions as the result of a study of some 1,200 experiments with white mice poisoned with different hydrocarbons (paraffins, cycloparaffins, aromatic hydrocarbons, olefins, and a few others):

1. The toxicity of benzine, with reference to acute poisoning, depends principally upon its content of paraffins, cycloparaffins, and aromatic hydrocarbons. With a small percentage content of benzol and its homologues the toxicity of benzine vapor (at the same boiling point) is the greater, the higher the cycloparaffin content and the less the paraffin content.

2. The single phase toxicity increases with the raising of the boiling point, while the double phase toxicity diminishes with this increase in boiling point.

3. The relation of the specific gravity to poisoning is especially notable when there is a low content of aromatic hydrocarbon. Similarly the boiling point range for naphtha fractions can be used as an index of toxicity.

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2. The single phase toxicity increases with the raising of the boiling point, while the double phase toxicity diminishes with this increase in boiling point.

3. The relation of the specific gravity to poisoning is especially notable when there is a low content of aromatic hydrocarbon. Similarly the boiling point range for naphtha fractions can be used as an index of toxicity.

4. The toxicity of benzine in these investigations was not appreciably altered by purification.

5. "Cracked" benzines obtained by the Bergius method resemble natural benzines in their toxicity.—L. T. F.

INDUSTRIAL POISONING IN RAYON MANUFACTURE. *A. Trossarelli. Abstr. as follows from Monatsschr. textil. Indust., March, 1929, vol. 44, Special No. 1, pp. 5–8, in Chem. Abstr., Jan. 10, 1930, vol. 24, p. 237.*

Severe psychoses marked several cases of carbon disulphide poisoning in rayon workers.—P. D.

THE ESTIMATION OF THE TOXICITY OF CARBON MONOXIDE CONTAMINATED AIR. *W. Deckert. Arch. f. Hyg., Oct., 1929, vol. 102, pp. 254–262.*

Animal experiments were made in which the composition of the air breathed was changed by the addition of carbon dioxide and carbon monoxide. The amount of carbon dioxide varied from 1.3 to 3.6 per cent.; the amount of carbon monoxide from 0.01 to 0.23 per cent. Canaries and white mice were used. With increasing carbon dioxide content and decreasing oxygen and with similar amounts of carbon monoxide in each case, the toxicity increases. The author has been able to show by consistent animal experiments that the toxicity (T) of a gas mixture containing carbon dioxide, carbon monoxide, and oxygen may be defined by the expression

$$T = \frac{(\%\,CO_2)\ (\%\,CO)\ (500)}{\%\,O_2}$$

—L. T. F.

CARBON MONOXIDE POISONING WHILE WELDING A PIPE. *L. Schwarz. Abstr. as follows from Zentralbl. f. Gewerbehyg., April, 1929, N. S. vol. 6, pp. 111–115; Gas- u. Wasserfach, vol. 72, p. 1056, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 575.*

Carbon monoxide poisoning of men working inside of a pipe during welding was due to burning of the bituminous coating. This was obviated by not using the coating for a length of 12 inches from each end of the pipe, and by using oxygen masks or those giving protection against carbon monoxide.—P. D.

NON-POISONOUS ILLUMINATION GAS. *A. Sander. Abstr. as follows from Brennstoff- u. Wärmewirtsch., 1929, vol. 9, pp. 335–336, in Chem. Abstr., Jan. 10, 1930, vol. 24, p. 226.*

Sander discusses the experiments of the Berliner Städtische Gaswerke concerning the removal of carbon monoxide to obtain a nonpoisonous gas.—P. D.

SOME PHYSIOLOGICAL ASPECTS OF COPPER IN THE ORGANISM. *F. B. Flinn and J. M. Inouye. Abstr. as follows from Jour. Biol. Chem., 1929, vol. 84, pp. 101–114, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 407.*

After feeding cupric chloride to rats, the distribution of copper in the urine, feces, and viscera was determined. The livers of a number of animals were examined for copper as were also human livers obtained at necropsy. Very little copper was deposited in the bones nor did it replace calcium in *in vitro* experiments. The distribution of copper between blood plasma and corpuscles was also determined. No methemoglobin formation followed prolonged copper ingestion nor was there any evidence of a hemolytic effect.

When fed to guinea-pigs, copper stimulated blood formation, increased the oxygen capacity of the blood, and improved growth, as determined over a period of eighteen months.

TOXICITY OF LEAD COMPOUNDS. *J. S. Buck and D. M. Kumro. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., Feb., 1930, vol. 38, p. 161, in Jour. Am. Med. Assn., April 5, 1930, vol. 94, p. 1098.*

Buck and Kumro investigated the toxic effect of certain groups of lead compounds and find that tetramethyl lead is of relatively low toxicity compared with other lead compounds. Investigations of the effect of tetramethyl lead on animal tumors are to be undertaken. It is suggested that the type of lead compound on which attention should be concentrated would possess a tetravalent lead atom (or atoms), methyl radicals, and one or more radicals carrying amino, hydroxyl, or similar groups capable of combining with cell constituents. Such a compound is as yet unknown. The minimum lethal doses of certain organic lead compounds have been determined.—K. R. D.

THE PATHOLOGY OF METABOLISM DURING LEAD POISONING. *A. Carni. Abstr. as follows from Trudy materialy Ukrain. gosudarstv. Inst. pat., 1928, vol. 6, pp. 227–234; Ber. ü. d. ges. Physiol. u. exper. Pharmakol., 1929, vol. 49, p. 551, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 429.*

Dogs and cats were poisoned by the oral administration of lead protein over a period of 85 to 129 days. Dogs were more sensitive to lead than cats. In chronic lead poisoning the nitrogen elimination was greater than the nitrogen absorption, but the nitrogen metabolism was qualitatively unchanged. In the blood there gradually developed an azotemia. After one month there was a decrease in the alkali reserve; the inorganic phosphorus of the blood increased, the acid-soluble decreased.

THE INFLUENCE OF HYDROCHLORIC ACID ON THE FLUCTUATIONS OF PHOSPHORUS AND CALCIUM METABOLISM IN EXPERIMENTAL LEAD POISONING. *A. Carni and E. Israilevie. Abstr. as follows from Trudy materialy Ukrain. gosudarstv. Inst. pat., 1928, vol. 6, pp. 237–249; Ber. ü. d. ges. Physiol. u. exper. Pharmakol., 1929, vol. 49, p. 830, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 660.*

Three dogs received white lead (7 gm. per kg. per day) plus 0.1 normal hydrochloric acid (100–250 c.c. per day), to a total of 3.74, 6.99, and 17.9 gm. white lead in a period of 56, 246, and 176 days, respectively. There was an increase in the blood calcium, in certain periods increased elimination of calcium in the urine and feces and a decided therapeutic effect of hydrochloric acid as shown by subjective improvement, alleviation of the toxic symptoms, and protracted duration of life.—P. D.

THE EFFECT OF HYDROCHLORIC ACID ON THE VARIATION OF THE INTERMEDIARY NITROGEN METABOLISM IN EXPERIMENTAL LEAD POISONING. *F. M. Suponitzka. Abstr. as follows from Trudy materialy Ukrain. gosudarstv. Inst. pat., 1928, vol. 6, pp. 250–261; Ber. ü. d. ges. Physiol. u. exper. Phar-*

makol., 1929, vol. 49, p. 830, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 660.

In dogs with lead poisoning the blood nitrogen showed intermediate changes although the total nitrogen was unchanged; there was an increase in urea. The administration of hydrochloric acid increased the resistance of the dogs against relatively large doses of lead and lengthened the duration of life. Hydrochloric acid also reduced the urea.—P. D.

STUDIES ON THE INFLUENCE OF CHRONIC LEAD POISONING ON THE VAGINAL CYCLE IN RATS. *A. Forster. Abstr. as follows from Endokrinol., 1929, vol. 4, pp. 260–263, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 427.*

Even with large doses of lead no effect was noted on the vaginal cycle of the rat. It is not possible to postulate as a general rule for all animals that the gonads are especially sensitive toward heavy metals like lead.

COMPARATIVE STUDY OF THE TOXICITY OF LEAD SULPHATE AND WHITE LEAD. *K. B. Lehmann. Arch. f. Hyg., 1929, vol. 101, no. 4, pp. 197–204.*

The somewhat prevalent idea that while white lead is toxic, lead sulphate is more or less harmless because of its insolubility in water was shown by the author to be erroneous many years ago. The present investigation was undertaken in order to place the relative toxicity of the two salts upon a quantitative basis. Both cats and rabbits were used as experimental animals. These experiments showed that from a practical point of view there is little difference in the toxicity of the two compounds. Lead sulphate is similar to white lead in the dosage and the length of time necessary to cause poisoning and death.—L. T. F.

COMPARATIVE STUDY OF THE TOXICITY OF WHITE LEAD SULPHATE AND WHITE LEAD CARBONATE. *F. Koelsch, E. Lederer, and R. Koelsch. Arch. f. Hyg., 1929, vol. 101, no. 4, pp. 234–256.*

The authors carried out both feeding and inhalation animal experiments with the two commercial lead compounds. No significant difference in relative toxicity of the two substances could be found. The commercial description of white lead sulphate as "safe and practically nonpoisonous" or as "relatively harmless" is unjustifiable.—L. T. F.

AN ELECTROLYTIC METHOD FOR THE DETERMINATION OF SMALL AMOUNTS OF MERCURY IN BODY FLUIDS AND TISSUES. *A. G. Young and F. H. L. Taylor. Abstr. as follows from Jour. Biol. Chem., 1929, vol. 84, pp. 377–391, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 392.*

It is shown that hydrolytic oxygen compounds of mercury are not formed in the presence of sulphuric acid; that reduction of Hg^{++} to Hg^{+} increases its loss in open digestion; and that mercury is not completely precipitated on copper even after digestion and prolonged standing. An electrolytic method was, therefore, devised for determining mercury, which is applicable to physiologic fluids, with an accuracy of 1 per cent. The method consists in concentrating the mercury by electrolysis, dissolving it from the electrode by nitric acid, and determining the mercury thus obtained by titration with potassium sulphocyanate.

J. I. H.
Sept., 1930

THE HANDLING OF MERCURY. *A. Stock. Abstr. as follows from Ztschr. f. angew. Chem., 1929, vol. 42, pp. 999–1001, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 669.*

Since numerous pathologic conditions are produced by the toxicity of mercury, it is suggested that suitable hoods and storage cabinets for this metal be used. Photographs and working drawings of proposed hoods are given.—P. D.

EFFECTS OF TEMPERATURE AND PRESSURE ON THE UPPER EXPLOSIVE LIMIT OF METHANE-OXYGEN MIXTURES. *C. M. Cooper and P. J. Wiezevich. Indust. and Engin. Chem., Dec., 1929, vol. 21, pp. 1210–1214.*

Both temperature and pressure markedly affect the upper explosive limit of methane-oxygen mixtures. The greater either variable, the smaller the amount of oxygen necessary for reaction. Spontaneous reaction occurs above 400°C. for the pressure range investigated. Complete consumption of the oxygen does not take place on the explosion of methane-oxygen mixtures at high pressure.—*Author's Summary.*

POISONING WITH NITRIC ACID FUMES. *Lancet, Dec. 7, 1929, vol. 2, p. 1218.*

In a factory near Bucharest the firemen were called to put out a fire due to the breakage of a case containing bottles of nitric acid. The acid was concentrated and contained no undue proportion of nitrous acid and no sulphur impurities. The sawdust in the packing became soaked with the acid and burst into flames in many places. When the firemen arrived they found a thick pungent smoke which caused an intense but transient sensation of irritation in the respiratory passages. They were taken to the hospital, but were discharged at their own request after a few hours. All three, however, were brought back to the hospital on the same day; they vomited, complained of sharp pain, and quickly developed pleurisy and bronchopneumonia. The general symptoms resembled those noted after the inhalation of chlorine or other irritant gases. One of the three cases proved fatal; two recovered.—E. L. C.

ROENTGEN CANCER AS OCCUPATIONAL DISEASE. *P. Krause. Strahlentherapie, Feb. 1, 1930, vol. 35, p. 210.*

HEALTH HAZARDS IN THE RUBBER INDUSTRY. *L. J. D. Healy. Abstr. as follows from India Rubber World, 1929, vol. 81, pp. 71–72, in Chem. Abstr., Feb. 10, 1930, vol. 24, p. 749.*

An investigation of the Health Standards Committee of the Safety Council leads to the classifying of antioxidants and accelerators into four groups: (1) highly toxic or irritant, to be avoided or used with extreme caution; (2) moderately toxic or irritant, care to be used; (3) slightly toxic or irritant, no hazards with proper handling but hazardous with promiscuous handling; and (4) relatively low toxicity, with no hazard by ordinary handling. A list shows eight, twenty, twenty-four, and fifty-four commercial accelerators and antioxidants (some repeated by commercial and chemical names) in the four groups.—P. D.

TOXIC SUBSTANCES IN THE RUBBER INDUSTRY. *P. A. Davis. Abstr. as fol-*

lows from Rubber Age, 1929, vol. 25, pp. 199–200, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 524.

This instalment deals with hexamethylenetetramine.—P. D.

THE INFLUENCE OF DILUTION ON THE CARCINOGENIC EFFECT OF TAR. *I. Hieger. Jour. Path. and Bacteriol., 1929, vol. 32, no. 3, pp. 419–423.*

Experiments are described in which an ether extract of tar in three concentrations was tested out upon mice, to ascertain whether any variations occurred in the carcinogenic activities according to strength. A reduction in strength from 100 per cent. to 10 per cent. delayed the earliest appearance of a carcinoma, but did not lessen the total yield of tumors or the average induction period. On the other hand, a diminution in concentration from 10 per cent. to 1 per cent. prolonged the induction period and reduced the production of tumors to an extremely low total; apparently the threshold in this case was nearly found. The research indicates that increase in concentration of a carcinogenic agent beyond a certain point does not increase its power in originating tumors. The work was done in the usual way, by painting concentrations upon mice.—E. L. C.

TAR EPITHELIOMA. *P. Blum, J. Bralez, and de Vadder. Abstr. as follows from Bull. Soc. franç. de dermat. et syph., Nov., 1929, vol. 36, p. 1038, in Arch. Dermat. and Syph., April, 1930, vol. 21, p. 652.*

The patient, a worker in a gas plant, presented an epithelioma of the face which apparently developed on a burn from tar. Several similar cases have been recorded in France.

CANCERIZATION BY TAR. *H. Périgaud. Abstr. as follows from Neoplasmes, 1929, vol. 8, pp. 85–89, in Chem. Abstr., Jan. 10, 1930, vol. 24, p. 152.*

When tar products are rubbed on the skin of susceptible animals or injected into the mammary glands, they are absorbed by the organism and like all phenols diminish or paralyze oxidative processes. The liver normally neutralizes the toxicity of phenols by sulphonation but is usually unable to sulphonate a large quantity of tar and reduce its toxicity. The organism becomes inpregnated with phenols and reduction processes taking place in an acid medium lead to cancer formation. Alkaline earths as magnesium or calcium, injected at the time of painting with, or injection of tar, render the animals refractory to experimental tar cancer but cannot affect a malignant tumor already established. As the supply of sulphur reaching the body in food is insufficient to sulphonate large amounts of phenols, the injection of colloidal sulphur is suggested. Colloidal sulphur is able to sulphonate phenols directly and animals absorbing sulphur at the same time that tar was painted on the skin or injected into the mammary glands did not develop cancer nor did a mixture of sulphur with tar produce experimental tar cancer.

CONTRIBUTION TO THE STUDY OF TUMORS PRODUCED EXPERIMENTALLY BY CHEMICAL SUBSTANCES. MULTIPLE ABDOMINAL TUMORS IN THE WHITE RAT EXPERIMENTALLY PRODUCED BY THE INGESTION OVER A LONG PERIOD OF REPEATED DOSES OF A TAR PRODUCT MIXTURE. *S. Voronoff and*

G. Alexandrescu. Abstr. as follows from Neoplasmes, 1929, vol. 8, pp. 129–181, in Chem. Abstr., Jan. 10, 1930, vol. 24, pp. 152–153.

A general view of the experimental production of cancer followed by a description of the experiments of the authors. A mixture of tar, lanolin, aniline oil, and toluylenediamine was administered by mouth three to four times a week to white rats.

Acute Nephritis Due to Turpentine Poisoning. *W. E. McCorkle. Abstr. as follows from Hahneman. Month., 1929, vol. 64, pp. 609–613, in Chem. Abstr., Jan. 10, 1930, vol. 24, p. 251.*

A description is given of two cases of poisoning by turpentine as an occupational disease in painters. Both cases were characterized by a dark red, bloody, scanty urine with the odor of violets. In one case the urine contained 1.5 gm. albumin per liter.—P. D.

Colorimetric Determination of Turpentine in Air. I. II. *P. Andreev and A. Gavrilov. Chem.-Ztg., 1929, vol. 53, pp. 870–871.*

For description of this method, see This Journal, January, 1930, Abstract Section, p. 5.

DUST HAZARDS AND THEIR EFFECTS

A Preliminary Note on a New Method of Comparative Estimation of Dust. *A. J. Orenstein. Jour. Chem. Metall. and Min. Soc. So. Africa, Sept., 1929, vol. 30, pp. 89–91.*

The method of procedure referred to is that of photographing a beam of light as it passes through an atmosphere containing varying amounts of dust. The greater the density of the dust, the greater is the luminosity of the light beam. The idea appears to be practical and likely to give a valuable method of estimating dust. At present the apparatus is in an experimental stage; but a standard type of camera is being prepared at the Zeiss works.—E. L. C.

Solving the Dust Problem in a Quicksilver Plant. *G. H. Horne. Abstr. as follows from Engin. Min. Jour., 1929, vol. 128, pp. 732–734, in Chem. Abstr., Jan. 20, 1930, vol. 24, p. 319.*

A Cottrell electric precipitator has solved the problem of removing the dust, which is practically free from mercury. Experiences at several plants are cited and layouts illustrated.—P. D.

New Methods for Determining the Dust of Large Cities. *K. L. Pesch. Arch. f. Hyg., Dec., 1929, vol. 102, pp. 333–348.*

Pesch points out the unsuitability of the ordinary industrial methods of dust sampling for determining the street dust of large cities. He states that "grab" methods do not give a representative sample and that elaborate methods cannot be used in the city streets. He is of the opinion that the method of H. Liefmann as modified by Liesegang is the most suitable for this

purpose. Liesegang devised the method of examining the dust settling on a horizontal photographic plate and a vertical plate which is attached to a wind vane. Pesch modifies this method in the following ways: (1) by moistening the plate with a thin film of acid free vaseline instead of water, thus allowing a longer sampling period; (2) by subdividing the field to be observed into a smaller number of divisions in order to keep down the number of particles to be counted; and (3) by using a magnification of 58 instead of a magnification of 8, so that the 2-micron particles can be counted.

Pesch describes the results obtained by his method in three localities and states that they are in good accord with the results obtained by the gravimetric sedimentation method devised by R. Müller, which has been used at the Cologne Hygienic Institute for two years.

Pesch used a modified form of his method to determine the variation in the dust count of the air with height. For this work, he used only the horizontal plate fixed to a wooden lath attached to window sills at various heights. He found that the dust content on the street side decreased with increasing height, but that on the yard side it varied only slightly with height.—C. E. B.

REMARKS ON OCCUPATIONAL DUST. *J. C. Bridge. Brit. Med. Jour., Dec. 21, 1929, vol. 2, pp. 1143-1147.*

Diseases have been ascribed to dust from early times, but recently the subject has been receiving intensive inquiry. The dusts may be divided according as they exert a general toxic effect or a localized effect, either internally or externally. Chief among those which cause general poisoning are the dust and salts of certain metals. Here lead figures prominently. Daily inhalation of about 2 mg. of lead represents the threshold of dust which may cause chronic plumbism. The dust of other metals is met with industrially: that of arsenic, which, however, seldom causes general symptoms but rather localized affections of the skin; manganese dust is fortunately rare, as it causes pitiable nervous degeneration; zinc is not a toxic metal, but its fumes, like those of other metals, may set up metal fume fever; cadmium is not often met with, but it may poison like lead. Dust of other substances, such as the nitro and amido derivatives of benzene, including aniline, can cause general poisoning with blood changes and anemia of the aplastic type. Generalized anthrax may be taken as a type of disease caused by organic dust. Mildews are thought to cause weavers' cough, and to affect men working in malt houses.

The localized internal diseases caused by dust chiefly concern injury done to the lungs. Here the principal offender is silica dust, which occurs in such a great variety of industries. Asbestos dust is also now known to injure the lungs; it has recently been receiving much consideration. A fine type of generalized fibrosis, following upon the inhalation of various dusts, such as that of coal and of cement, has recently been described; but its exact significance has hardly yet been appreciated. Some vegetable dusts originating from grain are known to irritate the respiratory passages with injury to health, while the suggestion has been made that lung cancer may originate from inhaling industrial atmospheres charged with soot, just as

cancer of the bladder originates among those inhaling aniline dust and fumes. Dusts which can cause external troubles by irritating the skin are too numerous to detail; the most important, however, is pitch, which originates warts and epitheliomas.

The problem of the troubles originating from dust is not their cure; it lies in their prevention. The chemist and the engineer must assist in preventing the generation of dust, or in attaining the ideal of dust free industries.—E. L. C.

THE DUST CELL OF THE LUNG. *A. Jousset. Presse méd., Nov. 13, 1929, vol. 37, p. 1478.*

The author finds himself in disagreement with the recent work of Policard, who, after incinerating sections of lungs, claims to show that the black pigment often seen is mostly due to inhaled dust, and only a part of it to iron deposited from the blood. Jousset considers that air is aseptic and free from dust before it reaches the alveoli, and that the black coloration found is due to iron deposited from the blood. He claims that black spit treated with boiling hydrochloric acid loses its color, while no such change occurs if carbon particles are first mixed with the spit. Further experiments are being carried out.—E. L. C.

IS ANTHRACOSIS A DISEASE? *E. Arnould. Presse méd., Dec. 14, 1929, vol. 37, pp. 1624–1626.*

The author is concerned with the proposal made in France to include both anthracosis and silicosis as diseases which must be notified by practitioners. The present article is devoted to answering the question as to whether anthracosis really has an existence. Evidence is first quoted from French authors and then from those who have worked in other countries. Formerly, before the effect of different dusts upon the lungs was understood, the black lungs of the coal miner were considered to be pathologic. Now evidence indicates that pure coal dust does not in any way injure the lungs, but exists only as inert particles. Any damage present is caused by mixture with other forms of dust, particularly that of silica. English mortality statistics are quoted to show that men exposed to coal dust have no excessive mortality from tuberculosis, even though they do suffer in excess from bronchitis and pneumonia. Finally, the author concludes that anthracosis, as such, is a myth, and that it ought no longer to be included on the list of dust diseases. Certainly what has no existence ought not to be designated for notification as an occupational disease by practitioners.—E. L. C.

CONTRIBUTION TO THE STUDY OF PULMONARY ANTHRACOSIS. *A. Policard and M. Boucharlat. Compt. rend. Acad. d. sc., Jan. 6, 1930, vol. 190, pp. 73–74.*

The question as to whether very fine particles of coal dust exert a harmful influence on living cells was approached by experiments with conjunctival cells, macrophages, and embryonic lung tissue of a chick, cultivated *in vitro* upon material containing varying amounts of fine coal dust. The cells showed no harmful influence, but grew unaffected even though the amount of dust was considerable. The cells moved among the dust particles, adhered to them, or glided over them as though over any neutral support. The smallest particles were phagocytosed, while the

cells taking them in remained unaltered. Such results might be expected if pulmonary tissue can hold appreciable amounts of coal dust without being affected. In anthracosis the lungs seem to be infiltrated with coal, without the nutrition of the tissue or its respiratory function being damaged. Pulmonary anthracosis would appear to be an anatomic state, not a disease. —E. L. C.

PULMONARY ASBESTOSIS. *W. B. Wood and S. R. Gloyne. Lancet, March 1, 1930, vol. 1, pp. 445–448.*

A useful summary is given of present knowledge with regard to the effects which follow industrially upon inhaling asbestos dust. The cardinal symptoms are dyspnea and cough, often accompanied by anorexia, lassitude, pains in the chest, and loss of weight. The skin may have an unhealthy leaden hue. The chest expansion is defective; asbestos corns may be present in the skin of the hands. Fine dry crackles are to be heard on auscultation, and possibly friction rubs in the axillae. Asbestosis bodies may be found in the sputum; if so they help in confirming the diagnosis. Tubercle may be present as a superimposed infection. X-ray films show fine mottling and linear shadows throughout the lungs, exhibiting a diffuse haze resembling ground glass, while the cardiac shadow may have a shaggy appearance. Prognosis is bad, if once the asbestosis bodies are present. Cessation of exposure does not control the progress of the disease. Death ultimately ensues from bronchopneumonia or tuberculosis. Thus of fifteen cases reported in 1929, three have now died. The visceral pleura is thickened, especially at the base, and the whole pleural sac may be closed with adhesions. The lungs are firm and contracted. The fibrosis is most marked at the bases; but the apexes are also concerned. Microscopically all the pulmonary tissue is found to be affected, with increase of connective tissue and obliteration of alveoli. Asbestosis giant cells may be found and also asbestosis bodies, which later appear to possess an asbestos fragment as a central core upon which pigmented organic material has been deposited. A diagnosis may be made upon symptoms, signs, and X-ray appearances, together with a history of exposure to risk, even though asbestosis bodies are not found.—E. L. C.

A CASE OF PULMONARY ASBESTOSIS: DEATH FROM TUBERCULOSIS TWO YEARS AFTER FIRST EXPOSURE TO THE DUST. *W. B. Wood and D. S. Page. Tubercle, Jan., 1930, pp. 157–158.*

The clinical history and pathologic findings are given of a fatal case in a female who, as a spinner in an asbestos factory, had been exposed to dust for fifteen months. She rapidly developed tuberculosis which affected both lungs, the peritoneum, the intestines, and the ovaries and fallopian tubes. Her father had died from phthisis in 1928. In the lungs were found a large number of asbestos fibers and asbestosis bodies in various stages of formation.—E. L. C.

ACTION OF GRAPHITE DUST ON LUNG. *R. Hollmann. Abstr. as follows from Ztschr. f. Tuberk., 1928, vol. 52, p. 394, in Am. Rev. Tuberc., May, 1930, vol. 21, p. 111.*

The author examined the workers in a pencil factory for pneumonokoniosis. The workers inhale either a mixture of

carbon dust or graphite dust. A five-year contact with this work revealed in no cases a pneumonokoniosis, although the "snowstorm phenomenon" was observed in 9.1 per cent. of those cases over five years in the industry and in 1.6 per cent. of all workers. Clinically bronchitis and emphysema were observed nineteen times. Among the tuberculous changes noted there were two with calcified primary complexes, and two with cirrhotic and slightly inactive apical disease. Graphite dust, therefore, does not act differently from pure coal dust. The presence of pneumonokoniosis with either one of these or both is a rare finding.

What Place Does Silicosis Hold among the Pulmonary Diseases Due to Dust? *D. Glibert. Méd. du travail, Jan., 1930, pp. 51–62.*

The author of this useful article summarizes the present position of knowledge with regard to silicosis. He stresses the work of British investigators, of Collis, Mavrogordato, McCrae, Watkins-Pitchford, and Kettle. The article is mainly based on communications made to the International Congress held at Lyons in April, 1929. In an able way the present state of knowledge is presented, from the moment when small particles of silica, 5 microns or less in size, enter the alveoli and are removed by macrophages into the lymph passages of the lungs, until the fibrotic changes which ensue are infected with tuberculosis. The value of radiography for detecting the process is described. Finally the author points out that today nations can be divided into two groups on the subject of silicosis: The first has examined the facts and made known its findings; the second has not recognized the facts. He holds that it is not dignified for the Latin races to find themselves in the latter category.—E. L. C.

The Mechanism of Pulmonary Silicosis. The Influence of Silica Dust, from Rock Work in a Coal Mine, upon Cells Grown in Vitro. *A. Policard, S. Doubrow, and M. Boucharlat. Compt. rend. Acad. d. sc., Oct. 14, 1929, vol. 189, pp. 593–594.*

The authors report the results of experiments in which sterilized suspensions of silica dust were mixed with cultures of living cells. The cultures were composed of plasma and embryonic tissue from the lungs of chicks 2 weeks old. The dust was obtained from a coal mine while work was in progress for drilling a hard quartzite rock. The cultures were observed for three or four days. So long as no more than 10 drops of the dust suspension were added to a cubic centimeter of culture, the cells grew normally; if 20 drops were added, growth slowed or stopped. Cells which had phagocytosed dust particles, although not dead, looked ill. The experiments support the theory that silica dust acts by slowly dissolving, and then poisoning the surrounding living tissues.—E. L. C.

The Colloidal Theory of Silicosis. *P. Heffernan. Tubercle, Nov., 1929, vol. 11, pp. 61–62.*

This short note summarizes the author's view of what occurs when silica dust particles reach the pulmonary alveoli. Engulfed by macrophages they are carried into the lymph

channels; slowly they become hydrated and the soluble alkaline silicate reacts with the protoplasmic fluid of the enclosing cell which becomes vacuolated and dies, thus releasing the silicate to react with surrounding protoplasm. Hence in time the lung tissue is replaced by fibrous scar. The whole dust particle may or may not be dissolved. Any silicate, on this theory, as well as silica, should be capable of settling up silicosis. The way in which silica is eliminated from the body calls for extended research.—E. L. C.

SILICOSIS. *Lancet, Nov. 23, 1929, vol. 2, p. 1120.*

Information is given, in an answer to a parliamentary question, regarding the prevalence of silicosis as disclosed by compensation claims. One case had occurred in each of the following industries or processes: sand grinding (iron foundry), silica milling (silica flour manufacture), stone crushing (road making), tin mining, and lead mining; two cases in millstone dressing (corn milling); four cases in sandblasting (metal works); ten cases in stonemasons' work; and twenty-five cases in coal mining. These cases are mostly fatal cases where the cause of death was ascertained through a post-mortem examination ordered by the coroner; they must not be taken as affording any criterion of the incidence of the disease in the industries or processes concerned.—E. L. C.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

TWO YEARS' FIGHT AGAINST ANKYLOSTOMIASIS AMONG MINERS IN THE COAL FIELD OF ST. ÉTIENNE. *C. Garin, Doubrow, and Mounier. Méd. du travail, Jan., 1930, pp. 41–50.*

Ankylostomiasis existed on this coal field, but was practically exterminated, before the War. A number of foreign workers were then imported and the disease was reestablished.

The authors examined 1,200 workers by their own method of detecting the eggs of the parasites. They found 83 per cent. free from trouble; but there were thirty-one definitely sick and 173 others infected. All these were taken into the hospital and treated. The degree of infestation was closely associated with the degree of illness; and the sick had more eggs in their stools than the carriers. The sick exhibited not less than 200 eggs, and even as many as 3,000, in a mass of stool 22 mm. by 22 mm. The carriers had many times less.

Only the thirty-one definitely sick were incapable of work; they exhibited typical anemia, with dyspnea, rapid heart, fugitive edemas, gastric pains, and constipation alternating with diarrhea. The anemia showed first a stage in which only the hemoglobin had fallen in amount to some 70 per cent., and then a stage in which the red cells also were diminished by 10 to 60 per cent. While in hospital, the men were treated with freshly powdered thymol. By these means in fourteen months the percentage of carriers with 100 to 200 eggs per preparation had fallen from 60 per cent. to 9 per cent. Men definitely sick were cured in about a month, and two months later had lost all incapacity.

Examination of the nationality of those infected showed that men coming from North Africa, where ankylostomiasis is endemic, were particularly infested. The authors hold that only carriers with a large number of parasites are of practical danger underground. They should be detected by careful examination and should be treated with thymol. Such detection and treatment embodies the line of attack against the disease. To it must be added careful examination of all new workers applying for engagement.

The authors conclude that the disease never need create permanent incapacity as it is easily curable. The temporary incapacity it causes is easy to control and to follow up by blood examination.—E. L. C.

GLANDERS OF LUNGS SIMULATING PULMONARY TUBERCULOSIS: CASE. *E. H. A. Pask. Abstr. as follows from Tubercle, March, 1930, vol. 11, p. 257, in Jour. Am. Med. Assn., May 3, 1930, vol. 94, pp. 1447—1448.*

Pask's case was of the chronic type and closely simulated pulmonary tuberculosis. Death occurred six months after the onset of the chest symptoms. The patient, aged 35 years, had been working on a sheep ranch for two years, and had had charge of two horses. Eighteen months before the patient's admission, one of the horses had glanders. The horse completely recovered, and he was working with it twelve months afterward when he became sick with what he described as an attack of influenza, which lasted two weeks. When he tried to get up out of bed he could not put his heel to the ground. He noticed a small lump in the center of the calf of the right leg, and was unable to walk about. This persisted for two months, and as he was not getting any better he was admitted to the hospital. A week after admission a soft lump appeared in the left leg; this was needled and the fluid examined. A guinea-pig inoculated with the fluid died of glanders of the testicles.—K. R. D.

THE RELATIONSHIP OF DUST AND PULMONARY TUBERCULOSIS. *W. Watkins-Pitchford. Jour. Med. Assn. So. Africa, 1929, vol. 3, pp. 452–454.*

Water suitably applied may convert dust into mud which, however, may again become dust; hence silica mud is potential silica dust. The lungs of all adults contain inhaled mineral matter, part of which is always silica. Inhaled particles get into the pulmonary tissues by being phagocytosed in the air vesicles and transported into the lymphatic spaces. Particles too small or too large to be phagocytosed are not so transported. The phagocytes exercise no other sort of selection but take up any particle of suitable size, whether a dust particle or a microbe. Pulmonary tuberculosis of the adult usually arises by air borne infection; when the organism reaches a place where silica particles are present, it is the exciting cause of the commoner forms of silicosis. The presence of small and normal quantities of silica particles is a factor in susceptibility to apparently ordinary pulmonary tuberculosis. The factor of paramount importance is in any case the tubercle bacillus; the dust particle is comparatively less influential.

Pulmonary tuberculosis is an infectious disease which should be treated as such, just as today we deal with

smallpox or with plague. The expectorators of tubercle bacilli should be caught and isolated, and not left at liberty to infect others and even to enter an industry in which a silica hazard exists. Tuberculous workers should be excluded from such industries by initial and periodic examinations, for which purpose systematic radiography is of the utmost value. Systematic resort to postmortem examinations for industrial diseases, particularly silicosis, is needed to add scientific value to a death certificate; further it insures justice to both relatives and employers when compensation is granted for disease.—E. L. C.

TUBERCULOSIS OF SKIN AS OCCUPATIONAL DISEASE IN MINERS. *J. Fabry. Abstr. as follows from München. med. Wchnschr., Nov. 22, 1929, vol. 76, pp. 1962–1963, in Jour. Am. Med. Assn., Feb. 8, 1930, vol. 94, pp. 444–445.*

Fabry points out that tuberculosis of the skin, especially in former years, was frequently observed among coal miners. In most instances the disease was localized on the back of the hands and on the fingers. The author thinks that probably autoinfection with tuberculous sputum or with tuberculous nasal mucus was the cause of the skin disease. He points out that when coal was cut with a pick, the hands of the miners were often injured by falling stones. It is therefore understandable that, since the introduction of modern machines, these injuries have considerably decreased and consequently also tuberculosis of the skin. The author enumerates other modern improvements which provide better hygienic conditions for the coal miners.

INFLUENCE OF OCCUPATION ON SUSCEPTIBILITY TO TYPHOID AND PNEUMONIA. *A. S. Rabinovitch and U. S. Schucher. Abstr. as follows from Moskow. Med. Jur., 1929, vol. 9, p. 44, in Jour. Am. Med. Assn., May 10, 1930, vol. 94, p. 1546.*

Rabinovitch and Schucher believe that susceptibility to typhoid and pneumonia is determined largely by age, heredity, environment, and occupation. In the examination of 110 persons with pneumonia it was found that ninety-six were laborers and fourteen professional people. The death rate was higher among women than among men; alcohol addicts could not survive pneumonia at all. Of 138 persons with typhoid, ninety-three were laborers and forty-five were not. From this it is concluded that pneumonia and typhoid are more common in persons engaged in physical labor than in those engaged in other occupations.—K. R. D.

INDUSTRIAL SURGERY

THE TANNIC ACID TREATMENT OF BURNS. *W. C. Wilson. Med. Res. Council, Special Rep. Series No. 141, pp. 84. H. M. Stationery Office, 1929.*

The tannic acid treatment of burns consists in applying at the earliest possible moment a solution of tannic acid to the burned area. Coagulation of the damaged tissue results, with rapid analgesia, so that no pain or discomfort exists while the coagulum is present. The acute toxemia, known as shock, is greatly minimized and often prevented. Sepsis is usually avoided

or at worst is mild. Healing is rapid with mild scarring, and contractures are exceptional. The mortality for children under 10 years of age so treated for burns was 10.5 per cent. as compared with 38.7 per cent. in a series of comparable cases treated in other ways. With this treatment the outlook is favorable if the total body surface affected is less than 35 per cent., and is not hopeless even if between 35 and 60 per cent. of the entire surface of the body is burned. The first person using this treatment seems to have been Dr. E. C. Davidson, Detroit; it is now being widely adopted in Great Britain.

The report contains an appendix showing how first aid treatment of burns by tannic acid can be carried out. The necessary provisions for a first aid unit are stated; and instructions are given in the application of the materials provided. The adoption of this line of treatment for first aid in all factories where there is risk of burning injuries, will be a great advance in first aid treatment.—E. L. C.

ELECTRICAL BURNS. *H. E. Fisher. Abstr. as follows from Illinois Med. Jour., March, 1930, vol. 57, p. 201, in Jour. Am. Med. Assn., April 26, 1930, vol. 94, p. 1350.*

In severe cases Fisher requires treatment of shock in a hospital with rest in bed, complete relaxation, and sufficient dosage of morphine to secure freedom from pain. Fluids should be forced at once by mouth and physiologic solution of sodium chloride or a hypertonic saline solution should be given by transfusion or hypodermoclysis. The latter should be done with caution on account of the possibility of lung congestion. Kidney function should be restored early and this is one of the guides to the prognosis of the case. Sodium bicarbonate by mouth is of value in establishing the alkaline balance in the body. When possible, surgery should be withheld until later hours, after shock has been arrested. Application of sterile petrolatum without bandaging is sufficient until one of the preferred burn treatments is at hand. Fisher uses petrolatum for first and second degree burns only, and believes that greases, ointments, and salves are indicated only in these two types of burns. In the initial stage in serious burns of the second and third degree type, the treatment indicated is tannic acid application. A 2 or 5 per cent. aqueous solution of tannic acid is sprayed on the burn with an atomizer and repeated until the wound acquires a dark brown or mahogany color. If a spray is not available, it is applied on loose gauze. The treatment of burns with trinitrophenol has been found of value only in the first twenty-four hours. After that time its toxic effect irritates the tissues and may produce symptoms of nausea, dizziness, gastric upset, or rise in temperature, or a condition simulating toxic shock.—K. R. D.

THERMAL AND CHEMICAL BURNS OF SKIN: ROENTGEN TREATMENT. *C. Tamiya and M. Koyama. Abstr. as follows from Strahlentherapie, Dec. 28, 1929, vol. 34, p. 808, in Jour. Am. Med. Assn., March 29, 1930, vol. 94, p. 1027.*

Tamiya and Koyama report good results with roentgen irradiation in thirteen cases of thermal burns and two cases of chemical burns. The best feature of this form of treatment is the rapid diminution in both the spon-

taneous and the tactile pain. As a rule the relief from pain begins a few hours after the irradiation but occasionally it begins immediately.—K. R. D.

PROGNOSIS AND TREATMENT IN BURNS. *C. Kreibich. Abstr. as follows from Med. Klin., Oct. 25, 1929, vol. 25, p. 1656, in Arch. Dermat. and Syph., March, 1930, vol. 21, p. 472.*

Kreibich states that death from burns is the result of poisoning. The coagulated protein has a toxic effect. The prognosis in a case of burn is determined by the size of the area and also by the degree of tissue destruction. The author distinguishes five degrees of burning; namely, erythema, formation of blister, necrosis of the upper portion of the papillae of the corium, necrosis of the entire papillary layer, and carbonization. The third and fourth degree burns have the greatest toxicity because the scab is soft and consequently the poisonous substances are easily absorbed. In the fifth degree the danger of poisonous intoxication is somewhat less because in carbonization the crust is dry and the toxins are not so easily absorbed. In the third, fourth, and fifth degree burns death is likely to result even if only minor portions of the body are affected. A fourth-degree burn extending over one-eighth of the body surface may cause death, whereas a second-degree burn may cover one-third of the entire surface and yet the patient may recover. In the treatment of burns one should attempt to remove the toxins from the body. Some authors advise blood transfusion. However, the author recommends infusions with solutions of sodium chloride. He describes the case of a patient in whom one-fourth of the body surface was destroyed by third and fourth degree burns. The patient recovered after the intravenous administration of a solution of sodium chloride by means of continuous drop infusion.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

INDUSTRIAL EFFICIENCY AND FATIGUE. *G. P. Crowden. Proc. Roy. Soc. Med., Feb., 1930, vol. 23, pp. 479–485 (Epidemiology and State Medicine, pp. 19–25).*

The problems of industrial efficiency and fatigue offer increasing scope for use of that special knowledge of human life which medical men possess. Industrial success and prosperity depend as much on health and efficiency of workers as on efficiency of machines. Impetus was given by the Great War to study this human factor; national necessity led to the establishment of the Health of Munition Workers Committee, out of which developed the Industrial Health Research Board. In Germany extensive investigations are pursued at the Kaiser-Wilhelm Institut für Arbeitsphysiologie, at Dortmund, into such problems as relationship of age to capacity for heavy muscular work, influence of diet and nutrition on human efficiency, and optimum height of stairs up which loads have to be carried; a new system of training apprentices has developed in

Germany since the War. Factors influencing efficiency and capacity for work may be placed in two general groups—intrafactory conditions and extrafactory conditions. Many of these factors have been investigated in this country and in America. In particular the effect of the environmental conditions of temperature, humidity, and air movement on human efficiency have been studied.—E. L. C.

Labour Efficiency. A Preliminary Statement on Relativity of Factors Adversely Affecting the Efficiency of Agricultural Labourers. *E. A. Seagar. Trop. Agr., 1930, vol. 7, pp. 40–45.*

An effort not very satisfactory is made to establish a connection between labor efficiency and dietary. The investigation was made on sugar estates and cacao estates employing both East Indians and West Indians. The author takes as his standard of a necessary diet 4,000 to 5,000 calories per diem; surely excessive for anyone, even if working hard, in Trinidad. The Indians, however, work only five hours a day for four days a week, which would not appear to give time for an excessive expenditure of energy. Carbohydrates form the main articles of diet, composed of rice, flour, and some potatoes and roots. Whereas proteins and fats together amount to about 100 gm. daily, the carbohydrates vary from about 400 to 600 gm. The calorie values of the diet vary from 3,200 calories for an East Indian working on a sugar estate, to 2,000 for a West Indian working on a cacao estate. The author considers these values low, which they hardly seem to be. The method used for attempting to establish a correlation between health and diet is vague and unsatisfactory. The present article, however, is stated to be only a preliminary account of work in progress.—E. L. C.

The Pathologic Physiology of Work. II. Can Heavy Physical Work Cause Emphysema of the Lungs? *N. A. Podkaminsky. Abstr. as follows from Arbeitsphysiol., 1929, vol. 1, pp. 577–585, in Ber. ü. d. ges. Physiol. u. exper. Pharmakol., Jan. 1, 1930, vol. 52, p. 427.*

The author examined a group of persons who were engaged in heavy physical work and was able to establish emphysema in only 5 per cent. He concludes therefore that heavy physical work is capable of producing emphysema of the lungs only in the presence of constitutional predisposition.—M. C. S.

INDUSTRIAL ENVIRONMENTAL CONDITIONS

A Study of Heating and Ventilation in Schools. *H. M. Vernon, T. Bedford, and C. G. Warner. Indust. Health Res. Board, Rep. No. 58, pp. 62. H. M. Stationery Office, 1930.*

The systems of heating schools by means of ceiling panels and by underfloor hot water pipes which are described in this report, are referred to elsewhere in This Journal (Article Section p. 281). In addition, the report gives information concerning the effects of atmospheric conditions on efficiency and on school attendance. A

manual dexterity test—the assembly of bicycle chain links—was performed by the investigators at regular intervals when they sat in schoolrooms at various temperatures, and it was found that in air at a temperature of 61° and a cooling power of 6.8, their hands kept warm, and the test was performed at a gradually increasing speed. In air at a temperature of 50° and a cooling power of 10.1, the hand temperature gradually fell 18°, and the speed with which the test was finally performed was 12 per cent. less than before. Three boys reacted in the same way as the investigators, and it was concluded that if the children are to attain full efficiency at manual work, the schools ought to be kept at a temperature not much below 60°.

Yet of the 40,000 observations made in schoolrooms in winter (November to March), only 35 per cent. reached the specified temperature, and 25 per cent. were below 55°. The hand temperature of nearly 300 children attending schools heated in various ways, and of those at unheated open air schools, was determined at intervals throughout the day by means of a Moll thermopile, and it was found that this temperature varied in correspondence with the cooling power of the air. At cooling powers of 9 and 7.2, respectively, 40 and 18 per cent. of the children had a hand temperature below 70°, the lowest limit compatible with performing the school curriculum with efficiency. The children at open air schools showed hand temperatures rather higher than those at artificially heated schools at equal cooling powers, as they were specially fed, were warmly clothed, and they sat at work for short periods only, alternating with periods of physical exercise. Nevertheless, the efficiency of the children, in very cold weather, was only about half that of children in heated schools.

The absenteeism of 6,300 children was ascertained for a three-year period, and it was found that it varied in accordance with the temperature of the schools. In schools with an average temperature of 63.4°, 8.9 per cent. of the children were absent, while at schools with a temperature of 55.7°, 11.6 per cent. were absent. In the open air schools the attendance fell to less than half on very cold days, and as a sudden fall of temperature was accompanied by an immediate fall of attendance, it seems probable that this was due to the restraining action of the parents and not to ill health of the children. It is suggested that open air schools ought to be warmed by underfloor heating, or by high temperature ceiling panels.—H. M. V.

THE USE OF HILL'S KATA-THERMOMETER IN NAVAL HYGIENE. *F. Brancato. Abstr. as follows from Ann. di med. nav. e colon., 1929, vol. 2, pp. 3–16, in Bull. Hyg., Jan., 1930, vol. 5, p. 1.*

The author made observations on the ventilation, humidity, and so forth in various parts of the ship on which he was serving. Details are given of the sleeping quarters, the engine and boiler rooms. The first is most important because the freshness of the air is continually varying on account of the restricted space, the paucity of ventilation, the number of occupants, the proximity to the engines, and the conductivity of the constructive material of the vessel. A space of 478 cu. m.

was occupied by 124 individuals, giving 3.8 cu. m. per man, sleeping for about eight hours. After one hour the wet kata cooling power was 14 and the carbon dioxide percentage 1.5; after three hours the former figure was about the same, but the carbon dioxide percentage was doubled. As regards other parts of the ship, the high temperatures do not always allow of the use of the instrument, but speaking generally it proved very serviceable in determining the ideal degree of ventilation, having regard to the nature of the work to be done, a matter hitherto regulated purely empirically and on no scientific basis.—H. H. S.

COAL-FACE LIGHTING. *W. Zwanzig. Tr. Inst. Min. Eng., Jan., 1930, vol. 78, part 4, p. 228.*

The ordinary miners' electric hand lamp gives an illumination of about 0.2 to 0.5 foot candle. This author recommends a minimum of 10 foot candles at any point along the coal face. Harsh shadows should be avoided, and there should be freedom from glare. A system of lighting used in some German mines is described. In potash mines, where the rooms are lofty, searchlights or flood lights are used; but in ordinary coal seams of, say, 2 to 8 feet in thickness searchlights are unsuitable, and comparatively small lamps are installed at intervals of from 5 to 10 yards along the coal face. The electric current is obtained from the central supply for the mine, or from a compressed air motor and electric generator.

Output figures are given for a pit in Lower Silesia, where safety lamps were replaced by 150-watt lamps installed about 5 yards apart along the coal face. The average output per man-shift showed an increase of 23 per cent. with the increased illumination. At another pit a 10 per cent. increase in production was achieved through better lighting. Although no statistics are given, it seems that such a system of lighting must lead to a diminution in the number of accidents and in the incidence of miners' nystagmus.—T. B.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

THE MEDICAL SUPERVISION OF THE COMMERCIAL AIRPLANE PILOT. *H. J. Cooper. Jour. Am. Med. Assn., April 26, 1930, vol. 94, pp. 1294–1296.*

This article reviews the medical aspects of the regulation of air commerce by the Aeronautics Branch of the Department of Commerce, with especial reference to the medical selection and subsequent care of commercial pilots.—K. R. D.

THE INDUSTRIAL EYE. *F. M. Ruby. Minnesota Med., March, 1930, vol. 13, pp. 178–179.*

Dr. Ruby outlines the first aid procedure in industrial injuries to the eye as follows:

1. A visual test if possible.
2. An external examination looking for foreign particles in the skin of the lids, conjunctival sac, cornea, etc.
3. Cleansing of conjunctival sac of for-

eign material, using no rough or irritating methods, nor strong antiseptics. We prefer and recommend the use of normal saline, warm, or occasionally 1–5000 cyanid of mercury used after the instillation of a local anesthetic.

4. Removal of superficially attached foreign bodies from the cornea or conjunctiva. Any foreign body involving the stroma should be removed with great care, as injury to the stroma always results in scarring of the cornea with some loss of vision.

5. Instillation of one drop of one per cent atropine in the eye except where the tension of the eye is up or where past history is suspicious of a glaucomatous increase in tension.

6. Referring of any severe or even suspicious case to a trained eye man at the earliest rather than a late date following injury. Insurance companies never dislike to pay early bills but they frequently do question late bills.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

INDUSTRIAL RESEARCH AT HAWTHORNE. AN EXPERIMENTAL INVESTIGATION OF REST PERIODS, WORKING CONDITIONS AND OTHER INFLUENCES. *G. A. Pennock. Personnel Jour., Feb., 1930, vol. 8, pp. 296–313.*

The procedure and findings of test-room studies for a period of over two years are described. Constant observation and experimentation was made with a group of five women workers engaged in repetitive assembly work in an effort to determine the answers to such questions as the following: Are rest periods desirable? Is a shorter working day desirable? What effect do wrong or right methods of supervision have on a worker's effectiveness and morale? What are some of the factors that determine an employee's mental attitude?

A second test group consisting of five operators who were splitting mica was also studied.

The method consisted in maintaining all conditions as nearly constant as possible, with introduction from time to time of a single variable, such as a different method of payment; rest periods; mid-morning lunches; shorter or longer working day. Information as to amount of sleep, recreations, home conditions, and other outside influences, as well as personal influences within the factory such as the relationship between the supervisor and the operators, were secured through informal interview. Pulse rate, blood pressure, blood condition readings, vascular skin reactions, and other physical examination data were obtained from time to time. Diet and health practices were recorded.

The most surprising outcome was that productivity of the test group tended in general to increase, no matter what changes in working conditions were introduced. Fatigue was found not to be a controlling factor. Amount of sleep had a slight but significant effect on individual performance. Total daily production was increased by rest periods. Home conditions and other outside influences tended to create either a buoyant or a depressed spirit which modified production. Emotional status was reflected in performance; and the major component of this emotional condition was attitude toward supervisor. The infer-

ence from these studies was inescapable that the dominant factor in the performance of these employees is their mental attitude.

Consideration of the sensitiveness of the operators to the way in which they are treated led to studies of the emotional status and attitudes of other workers. All operators in the Inspection Organization were interviewed, to secure a picture of their problems, worries, likes, and dislikes, in relation to working conditions and supervision. This program is spreading to other departments, and is greatly modifying supervisory training procedures. Rest periods have also been introduced into several operating departments, affecting 5,000 employees, with indication of increases of production paralleling somewhat those of the test group.

THE STUDY OF WORK FEELINGS. *A. W. Kornhauser. Personnel Jour., Feb., 1930, vol. 8, pp. 348–351.*

With rare exceptions, investigations of workers' feelings have been either general descriptive studies or inquiries into specific situations for practical purposes. The question is raised here whether it is possible to go beyond these studies to the establishing of significant general relationships between workers' feelings and various features of working life and individual personality.

IMPROVING EMPLOYEE RELATIONS. A PLAN WHICH USES DATA OBTAINED FROM EMPLOYEES. *M. L. Putnam. Personnel Jour., Feb., 1930, vol. 8, pp. 314–325.*

In studying a group of relay assemblers under laboratory conditions, at the Hawthorne Plant of the Western Electric Company, it was observed that the increase in employee effectiveness was more closely related to an improvement in the mental attitudes of the subjects than to any of the major variations introduced during the experiment. The conversation of the group studied indicated that altered working conditions and relative freedom from traditional supervisory practices were the chief factors contributing to their improved mental outlook. These observations suggested that a plan for improving the attitude of employees should begin with a consideration of their likes and dislikes.

The plan herein described was evolved as a method for obtaining, applying, and analyzing such opinions. It consists in (1) approaching employees individually and requesting them to express their opinions; (2) getting their opinions on supervision back to supervisors indirectly by presenting them at conferences; (3) analyzing and classifying comments as a basis for future plant improvement and research study.

TESTS OF TEMPERAMENT AND PERSONALITY. *P. E. Vernon. Brit. Jour. Psychol., 1929, vol. 20, pp. 97–117.*

Temperament and personality are of extreme industrial importance, but it is very difficult to estimate them. Objective tests such as the Downey will-temperament test are open to severe criticism, and are very unreliable; but promising results were obtained by a method intermediate between the objective test and the subjective interview. This method has been tried by Köhler, Burt, and in several continental laboratories; in the present investigation it consisted in giving the

subjects various simple performance tests and games under conditions that were as normal as possible. From their remarks and behavior, which were carefully recorded, many traits emerged. Chief of these were aesthetic and scientific constructive interest, planning capacity, emotional instability and variability, extraversion-introversion, suggestibility, and persistence. These estimates appeared to agree well with the subjects' characteristics in real life, and the method is capable of systematization and practical application.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

THE MEDICAL PHASE OF THE WORKMEN'S COMPENSATION LAW. *J. S. Lawrence. New York State Jour. Med., Feb. 1, 1930, vol. 30, pp. 136–139.*

Lawrence discusses the problems which beset the practitioner as he enters the field of industrial medicine in New York State, and suggests that many of these difficulties could be alleviated if a better understanding existed between physicians, insurance companies, and employers.

Emphasis is placed on the need for a Medical Advisory Council, as an addition to the State Department of Labor, to give advice in regard to matters connected with the practice of medicine, to recommend such changes of administration or procedure as may be deemed important from the medical viewpoint, and to consider the qualifications of persons suggested for positions in the Department which involve the practice of medicine.

Under the Workmen's Compensation Law of New York State $20,000,000 is paid annually for compensation, and $8,000,000 for medical and surgical fees. Medical fees are increasing, but the loss of time per injury is growing less; these trends indicate better medical care. "There is ample opportunity for practice for every physician who wishes to share in industrial work, but on entering it he should thoroughly inform himself of the requirements of the law."—E. D.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

AN INVESTIGATION OF SICKNESS IN VARIOUS INDUSTRIAL OCCUPATIONS. *A. B. Hill. Jour. Roy. Statistical Soc., 1929, vol. 92, pp. 183–230.*

The results of three intensive investigations into the causation of sickness are condensed into this publication. The industries concerned are cotton weaving, printing, and cotton spinning. The records used are those of approved societies. The author presents the statistical methods he used and dwells particularly upon the difficulties with which he met in carrying out his investigations. Indeed the paper deals with methods rather than with results. Yet one or two points emerge, particularly that cotton weavers tend to suffer an excess from digestive troubles, while in the early spinning processes respiratory affections prevail.—E. L. C.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

COKE-MEN AND BY-PRODUCTS WORKERS: THEIR COMPLAINTS AND MALADIES. *T. Oliver. Brit. Med. Jour., May 31, 1930, vol. 1, pp. 992–994.*

The comparatively new industry of coking employs about 15,000 men in Great Britain. These men tend to experience, as the result of their occupation, irritation either within or without. Within they suffer from disorders of the stomach, which may progress to ulceration or even to a malignant growth. The men are sallow in complexion and of light weight. These disturbances in general health predispose to rheumatism and lumbago, which are also conduced to by the alterations in temperature to which they are exposed. Externally they are liable to rashes and warts which may become epitheliomas; the back of the hands and forearms and parts of the skin exposed to contamination with the products of coal distillation are the parts affected. When solid pitch is broken up the dust may cause acutely painful inflammation of the eyelids. A further possible hazard is from the

escape of carbon monoxide from the ovens. Special stress is laid by the author upon the amount of gastritis experienced, which causes severe pain, physical debility, and loss of time.—E. L. C.

HEALTH HAZARDS AND ACCIDENTS IN THE CHEMICAL INDUSTRIES. *W. J. Burke. Abstr. as follows from Safety Engin., 1929, vol. 58, pp. 318, 320, 322, in Chem. Abstr., April 20, 1930, vol. 24, p. 1910.*

An outline of the work of the Bureau of Industrial Hygiene of the Department of Labor of New York State in determining what progress has been made in development of ways and means toward health conservation and prevention of accidents in chemical plants.—P. D.

RATIONALIZATION IN THE BUILDING TRADE—WHEN? *J. Gibson. Jour. Nat. Inst. Indust. Psychol., April, 1930, vol. 5, pp. 108–113.*

It appears that the rate of progress in industry does not run parallel with scientific knowledge, but is limited to the speed forced by the circumstances of competition. The building industry is an outstanding example of an industry which is sheltered economically, and which, in consequence, shows scanty signs of progress in method. Amalgamation has not taken place on any large scale, and when a building of any size is erected, once the bare structure is up the rest of the work is handed over to a horde of subcontractors. Since they possess no cranes and other mechanical appliances for moving materials, all transportation of materials for plastering, woodwork, brickwork, and concreting within the building is by hand labor.

At a theater recently erected, several tons of sand and cement were carried every day in small sacks up a hundred steps to the top of the building, and even the water required for mixing had to be carried up four flights of steps. This method is not only responsible for an enormous and costly waste, but it also involves a great physical strain on the workers. Rupture is quite a common condition among noncraftsmen in the building industry. The writer suggests that the builder should arrange for ropeways, hoists, and cranes to supply and distribute materials, and for mechanical means to mix cement.—H. M. V.

INDUSTRIAL DISEASES AND THEIR PREVENTION. *H. Rolleston. Abstr. as follows from Munic. Engin. San. Rec., 1929, vol. 83, p. 331, in Chem. Abstr., Feb. 20, 1930, vol. 24, p. 902.* Brief discussion.—P. D.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

TOBACCO AND TOBACCO SMOKE AS AN ETIOLOGICAL FACTOR IN CANCER. *F. Lickint. Abstr. as follows from Ztschr. f. Krebsforsch., 1929, vol. 30, pp. 345–363, in Chem. Abstr., March 20, 1930, vol. 24, p. 1421.*

Despite the abundant clinical evidence of an etiologic rôle for tobacco, animal experiments with tar from tobacco yielded no carcinomas, although atypical epithelial overgrowth was produced.—P. D.

EXPERIMENTAL OIL AND TAR SKIN TUMOURS OF MICE. *C. C. Twort and J. M. Twort. Lancet, June 21, 1930, vol. 1, pp. 1331–1335.*

Some description is given of tumors produced experimentally by carcinogenic agents; in all 2,354 benign tumors and 1,743 malignant tumors were caused in 29,100 animals. Coal gas tars gave 11.6 per cent. benign tumors and 13.3 per cent. malignant; synthetic tars gave 12.3 per cent. benign and 14.6 per cent. malignant; shale oils gave 9.8 per cent. benign and only 3.1 per cent. malignant; while petroleum oils only produced 3 per cent. benign and 0.7 per cent. malignant.

The benign tumors included tiny thickenings of the epithelium, flat warts, and papillomata. The malignant tumors were all spinocellular, many of which exhibited a tendency to either cystic, scirrhous, hyaline, basal-celled, or medullary modifications. The deep margin of the tumors was usually well-defined, but laterally they tended to spread beneath the sound epithelium, and finally blend imperceptibly with the subcutaneous connective tissue. With the onset of ulceration and sepsis, complete healing of malignant tumors may take place; but total destruction of the tumor appears never to occur in the absence of ulceration. Changes in morphology of the cells are often due to the influence of neighboring cells. Metastases were all of the ordinary spinocellular type. No benign, and only one malignant tumor occurred of connective tissue origin; it resembled a round-celled sarcoma. The article is illustrated by eighteen reproductions of microscopic preparations.—E. L. C.

INCIDENCE OF RHEUMATIC DISEASES. II. RHEUMATISM IN INDUSTRY. *J. A. Glover. Lancet, March 22, 1930, vol. 1, pp. 607-612.*

The author, in the second of his Milroy Lectures, discusses the relation of industry to rheumatism. The group of rheumatic diseases accounts, among males and females, for 14 per cent. of the total sickness and disablement. Rheumatic disease falls heavily upon workers in metals exposed to risk of chill and trauma; thus puddlers in steel works are particularly affected.

Rheumatic diseases include a large number of varied complaints, which may for convenience be grouped under three headings: The first includes acute and subacute rheumatism; the second nonarticular pains, comprising muscular rheumatism, lumbago, and sciatica; and the third such chronic joint changes as rheumatoid arthritis, osteo-arthritis, and gout. The connection between acute rheumatism and either of the other two more chronic forms is slight at best. The exact causation of the chronic groups is not established. The most costly of the groups, so far as sickness insurance is concerned, is the last, which costs about twice as much as the second and three times as much as the first. Muscular rheumatism is more prevalent among women than among men; but the opposite holds good for lumbago and for sciatica. Women suffer more from brachial neuritis than do men.

Stress is laid throughout the lecture on the difficulty of obtaining really reliable information as to the incidence of attack rates for the various forms of rheumatic diseases, whether in

Great Britain or in other countries.—E. L. C.

CIRCULATORY SYSTEM

THE RESPIRATORY FUNCTION OF THE BLOOD IN CHRONIC AND IN ACUTE ANILINE POISONING. *L. Schmidt-Kehl and C. Waskewitsch. Abstr. as follows from Arch. f. Hyg., 1929, vol. 102, pp. 192–201, in Chem. Abstr., April 10, 1930, vol. 24, p. 1668.*

The changes in respiratory character of the blood during aniline poisoning are due to changes in the properties of the hemoglobin rather than to the presence of methemoglobin. During chronic aniline poisoning of animals, the oxygen binding capacity of the hemoglobin appears to be increased, since it becomes relatively less reduced than the hemoglobin content. During acute poisoning of animals, the hemoglobin becomes inactive. The oxygen binding capacity is reduced at first, but in the period of recovery the conditions resemble those observed in chronic poisoning. Acute poisoning in man is associated with a reduction of the oxygen binding capacity which persists after the disappearance of the methemoglobin, but becomes increased during the period of recovery.—P. D.

RESPIRATORY SYSTEM

PYRETHRUM: ETIOLOGIC FACTOR IN VASOMOTOR RHINITIS AND ASTHMA. *M. A. Ramirez. Abstr. as follows from Jour. Allergy, Jan., 1930, vol. 1, p. 149, in Jour. Am. Med. Assn., March 15, 1930, vol. 94, p. 822.*

In addition to the hazards encountered by industrial workers in the gathering of pyrethrum flowers and in their manufacture into insect powder, those resulting from the inhalation of fumes from popular insecticides are pointed out in the literature. Attention is directed by Ramirez to another source of danger inherent not only in the wild variety of pyrethrum, or chrysanthemum, but in the cultivation of the plant in gardens, by private citizens, or in hothouses by florists. As these contacts are presented at all seasons throughout the year, pyrethrum should be regarded as an etiologic factor in perennial rhinitis and asthma, and in certain types of dermatitis. For these reasons the necessity of testing with pyrethrum is emphasized.—K. R. D.

THE RESPIRATORY MOVEMENTS IN GRADUAL HYDROCYANIC ACID POISONING. *H. Taylor. Abstr. as follows from Jour. Physiol., 1930, vol. 69, pp. 124–134 in Physiol. Abstr., June, 1930, vol. 15, p. 161.*

The effect of gradual poisoning by hydrocyanic acid gas upon respiration confirms the researches of Lumsden with regard to the four centers: (1) pneumotaxic, (2) apneustic, (3) expiratory, (4) gasping. In cats there is successive elimination of the first two centers by this poison; in rabbits both these centers, if they exist separately, are eliminated together, but gasping is very similar to gasping in cats. In general the effects of the gas are obtained in the same order as those given by sections of the brain stem from above downward. Apnea is not produced in a gasping animal by overventilation with air, nor do the respiratory movements stop during the act of overventilation; in a cat the form of

the gasps is altered after artificial ventilation. Artificial ventilation with hydrocyanic acid gas mixture produces failure of the respiratory movements. Cutting the vagi appears to aid the formation of apneuses produced by hydrocyanic acid; the vagi evidently inhibit apneuses.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

ON THE IMPORTANCE OF VOLATILE POISONS. *H. Zangger. Abstr. as follows from Schweiz. med. Wchnschr., Jan. 5, 1929, pp. 9–11; March 23, 1929, pp. 325–331; May 4, 1929, pp. 469–475, in Bull. Hyg., March, 1930, vol. 5, pp. 249–250.*

Zangger, the Director of the Institute of Forensic Medicine in Zurich, calls attention in three lectures to the widespread increase of, and danger from, organic solvents and poisonous volatile substances during the last fifteen years in industry and in the home. [It would seem to be easier to do this in a small country like Switzerland than in a big industrial one like Great Britain, where the need for it is so much greater, though it is left in great measure alone.]

In the first paper he deals with the number of these volatile compounds and the criteria for their absorption either through the lungs or through the skin and only very rarely from swallowing. In connection with them one has to get rid of the prevailing notion that a poison usually acts through the stomach and digestive tract. He mainly occupies himself with the solvents used in cleaning materials, waterproofing solutions, sticky stuffs, solutions used for hardening purposes, substances used as a base for artificial leather—phenols, formaldehyde, and other aldehyde condensation products. He explains how mists arise (1) from the bursting of hydrogen bubbles at the surface of electrolytic baths (as in the now notorious effects during chromium plating). These tiny bubbles, too, he explains, have the property of concentrating certain organic substances thus taken up; (2) formation of bubbles in foam—with again the likelihood of higher concentration; (3) through breakages of, and explosions in, vessels containing fluids; and, above all, (4) in cellulose, lacquer and paint spraying, which has replaced hand painting in so many industries.

Zangger points out the differences in poisonous effect of substances closely related chemically, *e.g.*, dinitrophenol and trinitrophenol (picric acid), and the reductions, oxidations and combinations which take place in the organism after absorption. These he illustrates in chemical formulas.

In the second paper he shows how little is known of the poisonous nature of the gases given off by explosives and their danger in the absence of good ventilation. Similarly, he describes the great amounts of carbon monoxide, cyanogen, and nitrogen given off in the burning of small quantities of celluloid gramophone plates, and in the use of various forms of fire extinguishers containing, as they may, carbon tetrachloride, methyl bromide, and chloride, which, when they come into contact

with the flames, may generate gases of the phosgene group. He lays stress on the concealment of these poisonous properties under fancy trade names which are often described on the labels as "completely innocuous." Examples are cited of the consequences of ignorant use of these fire extinguishers.

The boot and shoe industries, the artificial leather and the rubber industries all use extensively the modern solvents and celluloid adhesive materials in place of stitching.

The hospital operation room is another place into which these materials have penetrated, and Zangger states that, on ten occasions, he has been called on to investigate fume poisoning in them from the decomposition products of degreasing substances, solvents for disinfectants, and even materials used for cleaning instruments.

In this section he deals with substances giving rise to gases and fumes (even rays) which have been scheduled in different countries as coming within the scope of workmen's compensation laws.

In the third paper he goes into detail as to the manner of pulmonary absorption of volatile solvents, especially in the widespread development of cellulose spraying, in its various physical and chemical aspects. Lastly, he deals with the methods of prevention by general and locally applied exhaust ventilation, the wearing of self-contained breathing apparatus (of the Proto and Salvus type supplied by Messrs. Siebe, Gorman & Co. Ltd.) and the canister, filtering respirators which have been developed for industrial use out of the army box type. Considerable space is taken up in pointing out the limitations in the use of the last named and the seriousness of the consequences which arise from disregarding them. [All through he seems to be speaking with considerable heat as though he felt an important subject was not receiving the attention it deserved.]—T. M. L.

POISONING BY EXHAUST GASES OF MOTOR CARS. *F. Schoofs. Jour. State Med., July, 1930, vol. 38, pp. 415–417.*

This article stresses the danger arising from carbon monoxide in exhaust gases, and gives the results of a few analyses wherein the carbon monoxide content varied from 1.16 per cent. to 8.92. The possible presence of other harmful hydrocarbons is also noted. —E. L. C.

ON THE QUESTION OF THE HARMFULNESS OF GASES EMANATING FROM SHAFT FURNACES IN THE CEMENT INDUSTRY. *K. W. Jötten and F. Sartorius. Abstr. as follows from Zentralbl. f. Gewerbehyg., 1929, N. S. vol. 6, pp. 2–3, in Bull. Hyg., March, 1930, vol. 5, pp. 250–251.*

Some children playing in the open at a distance of about 250 meters from a modern cement factory equipped with shaft furnaces were alleged to have suffered from symptoms of carbon monoxide poisoning due to the escaping fumes. The question was raised, therefore, of closing down the newly erected works as a danger to the neighborhood. The research department experimented to determine the quantities of carbon monoxide and carbon dioxide actually present in fumes emitted. None of the persons employed

in the works, not even those at the furnace openings, had ever shown symptoms of carbon monoxide poisoning. The carbon dioxide was present to the extent of 3.8 per cent. by volume, and carbon monoxide at 0.009 per cent.—an amount undetectable in a 20 per cent. blood solution either spectroscopically or by tannin, ferrocyanide, or soda lye methods. They conclude that with modern cement shaft furnaces no amounts of carbon monoxide, carbon dioxide, or sulphur dioxide are given off which can be harmful.—T. M. L.

CARBON MONOXIDE POISONING. *J. S. Haldane. Brit. Med. Jour., July 5, 1930, vol. 2, pp. 16–17.*

The whole subject is well summarized, including personal experiences under exposure to carbon monoxide. Headache may occur at 20 to 25 per cent. saturation of the blood hemoglobin with the gas, mental impairment at 30 to 40 per cent., and danger of coma at 55 per cent. Loss of memory and lack of judgment are definite symptoms both while under the influence of carboxyhemoglobin and after recovery; failure of coordination of movement was also present. Some persons become torpid, others hilarious, others ill-mannered and quarrelsome. As high as 80 per cent. saturation has been found after death. One per cent. in air breathed gives 50 per cent. saturation in fifteen minutes, and 80 per cent. in twenty-three minutes; under exercise, however, 50 per cent. may be reached in five minutes. Carbureted water gas used in the United States contains 30 per cent. carbon monoxide, English coal gas from 7 to 10 per cent., and exhaust gases from petrol vehicles 7 per cent. Treatment consists in artificial respiration, aided by the use of a mixture of oxygen with 5 per cent. carbon dioxide; rest is important.—E. L. C.

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The medicolegal significance of carbon monoxide poisoning is discussed. Suicides from this gas have risen in England from 2,765 in 1918 to 4,872 in 1928, and in Scotland from 190 to 474. Gas suicides accounted for 23 per cent. of all suicides, and for 28.6 per cent. of female cases. The accidental ways in which domestic gas may escape are many, through turning on taps by mistake or extinguishing a flame without turning off the gas. The occurrence of asphyxiation rises with the percentage of carbon monoxide in the gas supplied. While the attraction of hemoglobin for carbon monoxide is 200 to 300 times that for oxygen, the rate of elimination of carbon monoxide under exposure to air is comparatively rapid, and one-half is eliminated within an hour when the saturation does not exceed 40 to 50 per cent. In cases of coma elimination is delayed because of the lack of respiration. After death carboxyhemoglobin must be distinguished from nitric oxide hemoglobin. The administration of 7 per cent. carbon dioxide with 93 per cent. oxygen during artificial respiration to effect resuscitation was recommended.—E. L. C.

GERMAN GAS MASKS FOR PROTECTION AGAINST CARBON MONOXIDE. *K. Wollin. Abstr. as follows from Ztschr. f. d. ges. Schiess- u. Sprengstoffw.,*

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GERMAN GAS MASKS FOR PROTECTION AGAINST CARBON MONOXIDE. *K. Wollin. Abstr. as follows from Ztschr. f. d. ges. Schiess- u. Sprengstoffw.,*

1929, vol. 24, pp. 30–32, 71–73, in Chem. Abstr., March 10, 1930, vol. 24, pp. 1165–1166.

The development of the Degea carbon monoxide mask is described. The catalyzer consists of a mixture of copper oxide and manganese dioxide and contains a small quantity of calcium carbide, which generates acetylene and acts as a warning agent when the catalyzer becomes ineffective by reason of excess moisture. The mask is also effective against given amounts of phosgene, chlorine, ammonia, sulphur dioxide, hydrocyanic acid, and chloropicrin. A smaller sized mask is also described.—P. D.

INDUSTRIAL GAS MASKS ABROAD. *S. H. Katz. Abstr. as follows from U. S. Bur. Mines, Information Circ. No. 6206, 1929, pp. 13, in Chem. Abstr., Feb. 20, 1930, vol. 24, p. 902.*

This paper describes some of the industrial gas masks made abroad, especially the carbon monoxide gas masks, and the manufacturing plants, organizations, and laboratories dealing therewith.—P. D.

THE ABSORPTION, DISTRIBUTION AND EXCRETION OF CARBON TETRACHLORIDE IN DOGS UNDER VARIOUS CONDITIONS. *B. H. Robbins. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1929, vol. 37, pp. 203–216, in Chem. Abstr., March 20, 1930, vol. 24, p. 1429.*

Carbon tetrachloride was injected into the stomach, small intestine, or colon of dogs. There was no absorption from the stomach, some from the colon, most from the small intestine. The rate of absorption was increased by giving ethyl alcohol or fat at the same time. Analyses of tissues showed that bone marrow contained the most carbon tetrachloride, with the liver content next highest. Small quantities were found in blood, brain, kidney, lungs, etc. Practically all the carbon tetrachloride was excreted through the lungs; none was found in the urine. —P. D.

TOXICITY OF DICHLORO-DIFLUORO METHANE: A NEW REFRIGERANT. *R. R. Sayers, W. P. Yant, J. Chornyak, and H. W. Shoaf. U. S. Bur. Mines, Rep. Investigations, Serial No. 3013, May, 1930, pp. 15 (mimeographed).*

The authors' summary and conclusions are as follows:

Dogs, monkeys, and guinea pigs were exposed to air containing 20 per cent by volume of dichloro-difluoro methane vapor for 7 to 8 hours daily on five days, and for 4 hours on the sixth day of each week during a 12-week period. During the exposure they were observed for unnatural signs or symptoms; change in weight; changes in red blood cells, hemoglobin, and white blood cells and their types; fatality and pathology indicative of deleterious action of the gas.

1. Exposure for 7 to 8 hours daily to 20 per cent dichloro-difluoro methane produces mild to moderate to marked generalized tremor in dogs and mild to moderate generalized tremor in monkeys. When they attempt to walk, they act very much like persons suffering from alcoholic ataxia. They react to light and stimuli and do not become unconscious. The maximum severity of symptoms is reached in the first 10 to 20 minutes of an exposure. A tolerance is developed with successive exposures as manifested by decrease in severity of the symptoms. Guinea pigs exhibit no significant symptoms.

2. During the first two or three weeks of the test the weight and growth of some of the animals were slightly to moderately inhibited, but during the succeeding two to three weeks they regained any loss and

thereafter maintained weight and growth similar to unexposed control animals.

3. The number of red blood cells and hemoglobin tended toward a slight increase during the first two to three weeks of the test but thereafter was normal and similar to control animals; also, the number of white cells was the same as the controls. Differential white cell examinations showed a slight increase in the polymorphonuclear neutrophils and a slight decrease in lymphocytes in the blood of animals exposed to dichloro-difluoro methane. The number of eosinophils, basophils, lymphoblasts, endothelial cells, normoblasts, and Kurloff bodies was practically the same for both the animals exposed to dichloro-difluoro methane and the controls.

4. No fatalities occurred among the dogs and monkeys. The fatality among the guinea pigs used for symptoms, weight, and fatality observations was two out of a group of 16 exposed to gas and one out of a group of 16 controls during the 12-week test period, thus indicating no effect of exposure on fatality.

5. Autopsies performed on all animals revealed no gross pathology attributable to the exposure to dichloro-difluoro methane.

6. Pregnancy and bearing normal young were as frequent among the guinea pigs exposed to dichloro-difluoro methane as among the controls. No abortions or abnormal foeti were observed.

7. In so far as the results of animal experimentation serve as a measure of hazards to persons, the investigation described in this report has shown that the possibility of public health and accident hazards resulting from exposure to dichloro-difluoro methane when used as a refrigerant are remote.

—P. D.

HOUSEHOLD MECHANICAL REFRIGERATION WITH SPECIAL REFERENCE TO THE TOXICITY OF THE REFRIGERANTS UTILIZED: REPORT 2 OF THE COMMITTEE ON POISONOUS GASES OF THE AMERICAN MEDICAL ASSOCIATION. *C. P. McCord. Jour. Am. Med. Assn., June 7, 1930, vol. 94, pp. 1832–1838.*

In the main, this report is concerned with the hazards of refrigerants from the point of view of the consumer, but a short section is devoted to industrial poisoning from refrigerants. Ammonia, sulphur dioxide, and methyl chloride are discussed briefly in this connection.—K. R. D.

ETHYL ALCOHOL IN FOWLS AFTER EXPOSURE TO ALCOHOL VAPOR. *T. M. Carpenter. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1929, vol. 37, pp. 217–259, in Chem. Abstr., March 20, 1930, vol. 24, p. 1429.*

The concentration of ethyl alcohol in various organs and in the whole body was determined. The ratios of concentration in various tissues to that in blood were as follows: brain 0.6 to 0.9, eggs 0.8, heart and lungs 0.7, spleen 0.7, muscle 0.7, kidneys 0.6, whole body 0.6, alimentary tract 0.6, skin 0.5, and fat 0.1. In general, hens showing the most muscular activity had lower concentrations of ethyl alcohol. With a concentration above 2.5 mg. per gram of blood the hens showed abnormal behavior. The lethal concentration was 3.7 to 5.6 gm. per kilogram body weight.—P. D.

FINAL REPORT OF THE DEPARTMENTAL COMMITTEE ON ETHYL PETROL. *Ministry of Health, pp. 91. H. M. Stationery Office, 1930.*

The conclusions arrived at by the Committee are in full agreement with those previously come to in the United States. Much further experimental work was carried out before a decision was reached. This work is described in detail in a series of valuable appendixes. The first is concerned with the detection of lead by a new method for discovering minute amounts, the

second deals with the possibility of ethyl petrol being absorbed through the skin, and the third and fourth have regard to the possibility of danger arising from carbon monoxide in street blocks or garages. The results of these experiments show that:

1. Small amounts of volatile lead and significant amounts of nonvolatile lead are present in the lubricating oil in the crank cases of motor vehicles using ethyl petrol as fuel, the maximum amount of volatile lead found being approximately one-sixteenth by weight of the amount of lead tetraethyl in ethyl petrol. In view of the experiments conducted by Professor Dixon, there is no danger of the absorption of lead tetraethyl through the skin, should oil of this character remain on the hands.

2. Cylinder and exhaust pipe deposits from cars run on ethyl petrol contain only negligible traces of volatile lead, but large quantities of nonvolatile lead compounds. Owing to the coherent nature of these deposits there is little danger of the lead from this course getting into the atmosphere as dust.

3. There is no serious danger to health from the spillage of ethyl petrol, even in the case of confined spaces such as closed garages and repair shops, and if adequate ventilation of such premises is secured the danger from spillage is negligible.

4. If ethyl petrol were used universally the quantity of particulate lead which would be retained in the air passages and lungs of drivers under very severe traffic conditions would not be likely to exceed 0.2 mg. per day; pedestrians would retain daily in their lungs and air passages a much smaller quantity than this. On these figures, and having regard to existing knowledge, neither pedestrians nor drivers would be likely to inhale dangerous quantities of lead even when "puffs" were blown out of the exhaust pipes of motor vehicles during the acceleration of their engines.

5. In view of the fact that a mixture equivalent to 7 c.c. of ethyl petrol was applied daily to the shaved skin of rabbits for 130 days without the occurrence of ill effects, even garage workers who are engaged on repair works or on filling petrol tanks and whose skin is therefore most likely to come into contact with ethyl petrol, cannot be regarded as subjected to any danger.

6. There is no danger in streets from the lead or the carbon monoxide emitted from the exhausts of motor vehicles.

7. The calculated amounts of lead in the air of streets and garages, based upon the amounts of carbon monoxide found by analysis therein, are in general agreement with the amounts of lead found by experiment under conditions representing a traffic block.

8. The proportion of particulate lead retained by the lungs depends upon the depth of breathing. The proportions are 16 per cent. when breathing while at rest (sitting), and 32 per cent. when breathing during gentle exercise; American investigators found that 15 per cent. of the particulate lead was retained by the lungs of men breathing normally at rest.

9. The odor of the exhaust gas produced by the combustion of ethyl petrol when diluted with air is not distinguishable from that produced by other fuels used for internal combustion engines.

Based upon these results and the experiments carried out in the United States the Committee concludes that:

1. The widespread use of ethyl petrol as a motor fuel for motor vehicles would not increase the proportion of particulate lead in the atmosphere of streets to such an extent as to constitute a risk even to the health of that part of the population which is most exposed—namely, police officers on traffic control duty and drivers of motor and other vehicles.

2. In a properly ventilated garage there would be no danger to health from the exhausts of motor vehicles, or from the evaporation of ethyl petrol owing to spillage. Even in a badly ventilated garage the danger due to spillage would not be serious. It should be stressed, however, that adequate ventilation of all garages, whether or not ethyl petrol is used, is a matter of considerable importance, and that the danger from carbon monoxide in an unventilated garage is very serious.

3. The risk arising from the absorption of lead tetraethyl owing to the contact of ethyl petrol with the skin is so small as to be negligible.

4. While the deposits from cylinder heads, etc., of cars using ethyl petrol contain a high percentage of lead, the quantity and nature of these deposits are such as to make them of little significance to garage workers, if due regard is had to ordinary cleanliness.

5. There is no danger to water supplies from the use of ethyl petrol.

Finally the Committee holds that there are no reasons for prohibiting the use of ethyl petrol so long as the following precautions are observed:

1. Cans and pumps should be labeled to indicate the presence of lead in the fuel and to warn the user to avoid spillage and not to use the fuel for other purposes than motor fuel.

2. The fuel should be dyed as an additional check against its use otherwise than as a motor fuel.

3. The amount of lead tetraethyl in the fuel sold for ordinary commercial purposes should not exceed 1 part in 1,300 parts by volume or about 1 in 650 by weight.—E. L. C.

DETECTION AND DETERMINATION OF LEAD IN "ETHYL" GASOLINE. *H. Kiemstedt. Abstr. as follows from Ztschr. f. angew. Chem., 1929, vol. 42, pp. 1107–1108, in Chem. Abstr., March 10, 1930, vol. 24, p. 1054.*

Wet a piece of filter paper and dry at a good mercury vapor lamp. Sunlight or the mercury lamp causes the decomposition of the lead compound and a deposit of lead oxide is obtained. Moisten with actinium hydroxide and test with potassium iodide to get yellow lead iodide. To determine the lead, which is usually about 1 gm. per kilogram of gasoline (German), treat 100 c.c. of gasoline with 2 to 3 c.c. of actinium chloride and 1 to 2 drops of water. Shake, allow to stand four to five hours with occasional filtration, until no more lead oxide is deposited. Dissolve the precipitate in dilute nitric acid and determine the lead as lead sulphate in the usual way.—P. D.

EXPERIMENTS ON TREATMENT OF CHRONIC LEAD AND MERCURY POISONING. *H. Ludwig. Abstr. as follows from Biochem. Ztschr., 1929, vol. 210, pp. 353–392, in Physiol. Abstr., April, 1930, vol. 15, p. 61.*

Mercuric nitrate forms soluble

double salts with potassium iodide and sodium thiosulphate more readily than lead nitrate. With sodium thiosulphate, mercuric hydroxide forms a precipitate of the sulphide more readily than lead hydroxide. With cystine, mercurous sulphide is formed more readily than lead sulphide, but the reverse is the case with proteins. The affinity of mercury ions for the amino group exceeds that of lead, but is much less than its own affinity for potassium iodide. Lead forms compounds with the organic hydroxyl groups in glycerol, sugars, etc., more readily than mercury. Very complicated conditions control the behavior of these two ions in serum, and lead is present in a state of low reactivity. Mercuric nitrate has a more poisonous action than lead on yeast fermentation, and this is not reduced by adding potassium iodide. These results help to explain the unfortunate results of treating chronic mercury poisoning by potassium iodide and its harmlessness in lead poisoning. In the former case mercury is mobilized but made no less poisonous. Unreactive lead is not much affected by potassium iodide.

THE ACTION OF MERCURY UPON THE HEART. *F. D. McCrea and W. J. Meek. Abstr. as follows from Jour. Pharmacol. and Exper. Therap., 1929, vol. 36, pp. 295–300, in Chem. Abstr., March 10, 1930, vol. 24, p. 1156.*

The effect of intravenous injections of mercuric chloride and mercuric succinate on the automatic and conductive mechanism of dog and cat hearts was studied electrocardiographically. —P. D.

THE MECHANISM OF DEFENCE AGAINST POISONING BY MERCURY VAPORS. *G. Francioni. Abstr. as follows from Biochim. e terap. sper., 1929, vol. 16, pp. 545–555, in Chem. Abstr., March 10, 1930, vol. 24, pp. 1155–1156.*

Intravenous injections of colloidal gold increase the resistance of rabbits against mercury vapor. Three injections of 0.1 c.c. of a 0.01 per cent. solution were more efficient than higher or lower doses. Though the general conditions of the animal were improved, the nervous symptoms remained unchanged. It is supposed that the specific place of the attack and defence in poisoning by metals is the reticuloendothelial system.—P. D.

INQUIRIES IN CHEMICAL LABORATORIES AS TO THE EXISTENCE OF SYMPTOMS OF MERCURIALISM. *Holtzmann. Abstr. as follows from Zentralbl. f. Gewerbehyg., 1929, N. S. vol. 6, p. 1, in Bull. Hyg., March, 1930, vol. 5, p. 251.*

The author sent out a questionnaire to the assistants and workers in two laboratories of Karlsruhe Technical High School (leading questions being as far as possible avoided) to try and bring out whether symptoms attributable to mercury were present—inflammation of the gums, loosening of the teeth, erythismus mercurialis as shown by headache, nervousness, excitability, and tremor. Excluding all negative and doubtful cases, sixteen of the twenty who made returns had symptoms. In one laboratory which had been used for only five months, in cleaning the floor behind a cupboard as much as half a pound of mercury was collected from a broken instrument. Near this point, five persons were pretty constantly at work and all of them complained.—T. M. L.

THERAPY OF MERCURY POISONING. *E. Hesse. Abstr. as follows from Arch. f. exper. Path. u. Pharmakol., 1929, vol. 144, pp. 327–330, in Chem. Abstr., May 20, 1930, vol. 24, pp. 2504–2505.*

In confirmation of previous results, the power of strontium thioacetate to counteract the effects of the administration of mercuric chloride to mice, rabbits, rats, guinea-pigs, and cats has been demonstrated.—P. D.

ZINC DUST IN INDUSTRIAL FACTORIES, ITS EFFECT ON THE HEALTH OF THE WORKER AND ITS DEPOSITION IN THE ORGANS OF THE BODY. *Nuck, E. Remy, and F. Holtzmann. Abstr. as follows from Ztschr. f. Hyg., 1929, vol. 109, pp. 598–610; Wasser u. Abwasser, vol. 27, p. 30, in Chem. Abstr., June 20, 1930, vol. 24, p. 3066.*

Zinc sprayers often become ill at their work. By means of X-rays, zinc was found not to deposit in the organs but is voided in the feces and urine. The dust, however, can cause lung trouble if inhaled in large amounts.—L. T. F.

DUST HAZARDS AND THEIR EFFECTS

DETERMINATION OF DUST IN THE AIR BY THE OWENS METHOD. *E. Vigdorick. Abstr. as follows from Gig. i. Epidem., 1928, vol. 7, pp. 10–19; Wasser u. Abwasser, vol. 26, p. 223, in Chem. Abstr., April 20, 1930, vol. 24, p. 1918.*

The methods of dust determination in air are reviewed. By means of the Owens method, the dust content of air in cement, hemp, and steel factories was determined.

MICROSCOPIC MEASUREMENTS FOR THE DETERMINATION OF PARTICLE SIZE OF PIGMENTS AND POWDERS. *E. J. Dunn, Jr. Abstr. as follows from Indust. and Engin. Chem., Analyt. Ed., 1930, vol. 2, pp. 59–62, in Chem. Abstr., April 10, 1930, vol. 24, p. 1554.*

Description is given of apparatus, types of mounts, magnification, focusing and measurement of particle size for particles from colloidal dimension up to sieve dimensions, with particular reference to paint pigments. A projection method with remote control is used. The method of counting and the calculation of particle size are discussed in detail and this method is compared with supplementary methods, such as sieving and elutriation. A form sheet used for the particle size analysis of powders is illustrated.—P. D.

COAL DUST EXPLOSIBILITY FACTORS INDICATED BY EXPERIMENTAL MINE INVESTIGATIONS 1911 TO 1929. *G. S. Rice and H. P. Greenwald. Abstr. as follows from U. S. Bur. Mines, Tech. Paper 464, 1929, pp. 45, in Chem. Abstr., Feb. 20, 1930, vol. 24, p. 944.*

The explosibility of dry coal dust is influenced by its size, its composition, the presence of inflammable gas in the air, the quantity, the distribution of the dust on the perimeter of the passageway, the strength of the source of ignition, and the surrounding conditions. Water cannot be relied on to prevent extensive explosions of bituminous coal dusts. The ignitibility of coal dust and its capacity to

propagate an explosion are influenced by its position. Coal dust on the floor is least likely to ignite or propagate an explosion. Tests of dusts from forty-three different coals ranging from anthracite to high volatile bituminous are given.—P. D.

PULMONARY ASBESTOSIS. A SOCIO-MEDICAL STUDY. *T. Oliver. Arch. f. Gewerbepathol. u. Gewerbehyg., 1930, vol. 1, pp. 67–76.*

A description is given from first hand observation of how asbestos is got in Canada and subsequently worked up into cloth and fine thread. Dust is created, particularly in the factory processes. Reference is then made to clinical observations upon asbestos workers suffering from the effects of dust inhalation. These effects, in a definite case, consist in well-marked diffuse interstitial pneumonia with chronic bronchitis and emphysema; there is also well-marked anthracosis. In the air passages and interstitial fibrotic areas certain distinctive foreign bodies are found; these are illustrated. The condition which results is a generalized rather than a nodular fibrosis, with no resemblance to the orderly whorled arrangement and sharp definition of the silicotic nodule. The question as to whether such lungs succumb more readily to tuberculosis is uncertain; but this secondary infection has been reported by several observers. Apart, however, from this the disease develops slowly but surely.—E. L. C.

PNEUMONOKONIOSIS WITH ESPECIAL REGARD TO SILICOSIS. *W. Mascher. Abstr. as follows from Hygiea (Stockholm), March 31, 1930, vol. 92, p. 232, in Jour. Am. Med. Assn., June 21, 1930, vol. 94, p. 2034.*

Mascher states that pneumonokoniosis can usually be diagnosed by thorough clinical and roentgen examination. In the early stages, diagnosis solely by clinical examination is impossible. In many cases without subjective or objective symptoms, roentgen examination reveals extensive changes. Clinically, dyspnea is the most pronounced symptom, in advanced cases often dominating the picture. In the cases with old or more recent tuberculous foci, there was no evidence that either the tuberculous processes or the silicotic changes were affected by the complication. As the incidence of the condition depends largely on the silica content of the dust inhaled and on the amount of the dust, strict prophylactic measures should be observed in all industries in which silica dust is produced. In addition, preliminary examination should be required of all workers, followed by periodic examinations, and pneumonokoniosis should be legally compensable as are other occupational diseases.—K. R. D.

CHALICOSIS OF THE LUNGS IN JAPAN. *T. Uchiyama. Abstr. as follows from Beitr. z. path. Anat. u. z. allg. Pathol., 1928, vol. 80, pp. 218–234, in Bull. Hyg., March, 1930, vol. 5, p. 249.*

[It is surprising that the author should make use of a now almost obsolete word when he means silicosis.] He explains the absence of recorded cases of silicosis in Japan by the very small number of stonemasons. In this paper he occupies himself entirely with minutely described macroscopic and microscopic appearances of three cases. Among 1,500 autopsies made at the Institute in Sendai in northeastern Japan only three were on stone workers. All three cases were associated

with tuberculosis. In two tuberculosis was not prominent, but the silicosis was pronounced. In the third it was tuberculosis which brought about death, the silicosis being slight. In one case the celiac lymph glands, *i.e.*, all the glands near the head of the pancreas, the pylorus and the hilum of the liver had undergone considerable enlargement and complete silicotic change; similar isolated fibroid nodules were present in the spleen and liver, the origin of which was undoubtedly due to stone particles.

By careful examination with polarized light, Uchiyama was able to show (*a*) that just as many stone particles were present in the abdominal glands named as in the lungs; (*b*) that in the peripheral zone of the fibroid nodule were a number of small particles, while in the center not only were there very tiny particles, but also some large ones; and (*c*) that in the nodules in the spleen and liver the particles were of a finer caliber.

As a result of proving the presence of stone particles in the spleen and liver he concludes that their carriage by way of the circulation is possible. The two cases in which the symptoms were most marked are said to have been associated with the status lymphaticus. He discusses, among other points, the experimental work of Gye and Kettle and Gye and Purdy, but all his references to British research work are at second hand—from Jötten and Arnoldi's book "Gewerbestaub und Lungentuberkulose."—T. M. L.

SOME ASPECTS OF SILICOSIS IN INDUSTRY. *G. Q. Lennane. Abstr. as follows from Jour. State Med., 1929, vol. 37, pp. 602–606; U. S. Pub. Health Engin. Abstr., March 8, 1930, vol. 10, IHS p. 1, in Chem. Abstr., April 20, 1930, vol. 24, p. 1910.*

Inhalation of silica dust causes the formation of fibrous tissue in the lung substance, gradually extending and encroaching on the aerating function of the lung tissue. Crystalline sandstone, quartz, quartzite, and flint produce a crystalline dust which is more harmful than dust containing amorphous silica. The onset of the disease is very gradual and, at first, difficult to recognize. The common complication is pulmonary tuberculosis, which is usually rapidly fatal. The use of water, steam, oil, and mechanical equipment for minimizing dust in factories, quarries, and mines is discussed.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

ON ANGUILLULOSIS (*Strongyloides intestinalis*) AND LAMBLIOSIS, TWO RARE PARASITIC DISEASES OF MINERS. *H. Teitge. Abstr. as follows from Klin. Wchnschr., 1928, vol. 7, pp. 1687–1690, in Bull. Hyg., March, 1930, vol. 5, pp. 255–256.*

In systematic blood examinations of miners the author frequently found eosinophilia present to the extent of 10 to 20 per cent. and more. This directed his attention to the occurrence of parasites—especially of intestinal worms, and he found them extraor-

dinarily frequent. He gives the clinical history of five cases of anguillulosis, the principal symptoms being weakness, stomach pains, loss of flesh, debility, rheumatic pains, and generally obstinate constipation. Strongyloides larvae were always to be found in the stools. The eosinophils varied from 2 per cent. to 48 per cent. *Strongyloides intestinalis* and ankylostoma were introduced into Germany. Teitge thinks the former is not nearly so harmless as has been believed and attributes much debility to this cause. Therapeutic remedies are singularly inefficacious. Hence the need for knowledge of its etiology in order to combat it by prophylactic measures.

The mode of entry of the parasite is principally through the skin (the hair follicles and sweat glands). Entry by the mouth is much less frequent. It would appear that larvae introduced by way of the gastric system do not enter the intestine directly, but traverse the wall of the digestive tube and thus arrive in the general circulation and behave similarly to larvae which have penetrated the skin. It is known that there are two kinds of adult strongyloides; a parasitic or intestinal form which includes only parthenogenetic females, and the free form—stercoral or rhabditiform—which develop in fecal matter outside the human body. Of this latter kind male and female forms are observed. The parthenogenetic females of parasitic form are generally situated in the intestinal wall itself and the eggs are laid in the depths of Lieberkühn's glands. The embryos can pass into the circulatory system instead of maturing in the intestine. Embryos or eggs evacuated with the feces develop into rhabditiform larvae, and represent the second free form (stercoral). Copulation takes place outside the body. The female (ovoviviparous) presents in the uterus eggs enclosing a completely formed embryo and liberates rhabditiform larvae which are soon transformed into strongyloides larvae. The infection leads to a great deal of incapacity for work.

The other infection described by Teitge is lambliosis which, in his opinion, sets up inflammation of the gall-bladder with vomiting and pain in the stomach. *Lamblia intestinalis* belongs to the class of flagellates. Eosinophilia is present to a much less degree than in anguillulosis.

Infection is caused by swallowing the cysts which form as soon as the lamblia reaches the large intestine. The cysts can remain alive for four to five months in moist earth. Flies may be the carriers as lamblia can be carried for days in their intestine. It was long contested that lamblia was pathogenic and especially that it could set up cholecystitis and cholangitis. Many writers now agree, however, that this is so. The author is convinced that they can. He gives details of three cases.—T. M. L.

TUBERCULOSIS IN POSTAL TELEPHONE AND TELEGRAPH OPERATORS. *G. Poix. Abstr. as follows from Presse méd., 1929, vol. 37, pp. 411–413, in Bull. Hyg., April, 1930, vol. 5, p. 328.*

This long article comprises a report of a Commission on the personnel of the postal telegraph and telephone operators of France. The mortality among these workers is given as 163 per hundred thousand workers between

the ages of 15 and 59, as against the mortality of 280 per hundred thousand of the general population. After suggesting alteration of the existing financial law dealing with the matter, the Commission points out that operatives suffering from tuberculosis should be given treatment with three years' leave of absence and a subsequent period of partial treatment for two years following, this period of absence to be reviewed every six months. The Commission further points out that it is essential that tubercle bacilli should be demonstrated in sputum except in unusual circumstances, when the evidence of clinical examination and radiogram may be admitted. The Commission draws a distinction between cases of pulmonary tuberculosis and non-pulmonary tuberculosis. In the latter there may be resulting deformity of bones and joints necessitating permanent invaliding from the service. Operatives should be free from active signs of tubercle bacilli for a period of six months before their return to work.

In admitting workers for the service the Commission lays emphasis on the need for careful examination and especially radiologic examination.—S. R. G.

TUBERCULOSIS IN WORKERS AFTER RESIDENCE IN A TUBERCULOSIS HOSPITAL. *B. Gordon and W. M. Cashman. Jour. Am. Med. Assn., May 24, 1930, vol. 94, pp. 1643–1645.*

In a follow-up study of 737 present and former workers in a hospital for diseases of the chest, the incidence of tuberculosis acquired after termination of service was found to be low—perhaps less than 2 per cent. The authors consider natural immunity and hygienic measures important from the standpoint of prevention, and suggest the favorable influence of a high carbohydrate intake.—K. R. D.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

OCCUPATIONAL DERMATITIS AND CHEIROPOMPHOLYX. *W. J. O'Donovan. Brit. Med. Jour., June 21, 1930, vol. 2, pp. 1133–1134.*

Cheiropompholyx is not a disease *sui generis*, but is associated with mental strain and instability of the nervous system. It occurs in occupations having a skin hazard; but it occurs in many other trades also. Under observation the presence of hysterical stigmata may often be demonstrated. It may be regarded as an occupational neurosis of the skin, if not originated, at any rate maintained, by compensation. The individuals affected may possess a predestined fragility of the skin, which might erupt under many factors of external or internal strain; but a spontaneous history of irritating, pinhead, watery blisters between the fingers, does not necessarily constitute a case of occupational dermatitis.—E. L. C.

THE FREQUENCY OF NICKEL ECZEMA. *W. Jadassohn and F. Schaaf. Abstr. as follows from Arch. f. Dermat. u. Syph., 1929, vol. 157, pp. 572–577, in Bull. Hyg., March, 1930, vol. 5, p. 254.*

The authors here contest the opin-

ions of Schittenhelm and Stockinger who maintain that the handling of nickel is a frequent cause of eczema and that in nickel plating works nearly all the persons employed suffer from a form of skin irritation which usually comes on eight to twenty days after starting work. The authors have made numerous inquiries and experiments and have come to the conclusion that the condition is not caused by nickel, but by some other substance used in the process. They visited several nickeling works in Zurich and observed carefully the processes and chemicals used: they obtained from the Sickness Insurance Institute figures relating to the health of 700 nickel workers and experimented by painting solutions of nickel sulphate on the skin.

One workman they examined, who had eczema on the face, neck, and arm while the hands were scarcely affected, attributed the condition to dusting the article with Vienna chalk. Tests were then made by applying Vienna chalk to the skin and also by applying a 10 per cent. solution of nickel sulphate to the skin. After twenty-four hours it was found that the Vienna chalk had caused redness and vesicles, but the nickel solution, although used in large quantities, had caused only a slight redness. A different kind of chalk was substituted for that used by the workman, and in a few months the eczema was cured.

The sickness records showed that there were only thirty-nine cases of nickel eczema in the years 1922 to 1927 and by testing these cases with nickel solution it was found that only one case was due to nickel and that was an idiosyncrasy, as it was not confined to definite areas but occurred generally.

As Walthard found that by painting guinea-pigs with nickel sulphate solutions, irritation at the site was always produced, the authors carried out similar tests on some women under treatment for gonorrhea—women being believed to be more susceptible to the poison than men and being also largely employed in nickeling work. Seven patients were painted on the hands and thighs several times a day with 20 per cent. nickel sulphate solution for an average of forty-four days and in no case did eczema result or was any skin irritation noticed. It is therefore thought that no importance can be attached to the experiments on guinea-pigs so far as man is concerned. The authors are confident that nickel does not cause eczema unless there is some idiosyncrasy.—A. J. C.

Ocular Lesions in Sulphur Miners. *H. Mita. Abstr. as follows from Klin. Monatsbl. f. Augenh., Dec., 1929, vol. 83, pp. 797–806, in Am. Jour. Ophth., April, 1930, vol. 13, p. 368.*

Mita observed very painful inflammation of the eyes of about 300 men after working not very long in a sulphur mine, due to the action of sulphuretted hydrogen. Careful chemical analysis of the atmosphere in the mine showed about 16 per 1,000 of sulphuretted hydrogen, while the test for sulphur dioxide was negative. After staying from twenty to forty minutes in the mine, the eye disturbance commenced with a feeling of foreign body in the eye and lacrimation, and from one to three hours later colored rings around the lamps were noticed, forcing the men to leave the mine. Almost invariably after some hours longer, violent pain with lacrimation and photphobia set in. At the

acme the cornea within the area of the palpebral fissure presented numerous punctiform opaque depressions; the palpebral conjunctiva was reddened, while the ocular conjunctiva was generally intact; and the sensibility of the cornea was more or less diminished.

Experiments on rabbits showed that direct action of sulphuretted hydrogen on the eye caused swelling of the corneal epithelium, with formation of vacuoles. The violent pain is caused by exposure of the nerve endings in the epithelial defects.

Prophylactic measures are improvement of ventilation and shortening of working hours. Gas masks are not necessary, since the eye affection is a direct lesion by the sulphuretted hydrogen, not an indirect one from circulation and respiration. For symptomatic treatment dionin (not cocaine), moist heat, and ointments are recommended.

SILVERING OF THE CORNEA AND GLAUCOMA IN OCCUPATIONAL ARGYROSIS. *L. P. Hua. Abstr. as follows from Arch. f. Augenh., Dec., 1929, vol. 102, p. 334, in Am. Jour. Ophth., May, 1930, vol. 13, p. 468.*

The patient, a man of 63 years, had been employed for thirty-five years in silvering mirrors. The cornea in each eye showed the presence of silver, together with other changes in the eye, but without generalized argyrosis. There was a bilateral glaucoma, with complete amaurosis in the left eye. Liu Pau Hua considered the glaucoma secondary to the local argyrosis.

PSEUDO-FOREIGN BODIES OF THE EYE. *H. Coppez. Abstr. as follows from Arch. d'opht., Aug., 1929, vol. 46, p. 449, in Am. Jour. Ophth., April, 1930, vol. 13, p. 366.*

It is noted that patients often complain of foreign body in the eye when the sensation is caused by the beginning of an inflammation such as keratitis or iritis. In industrial work, if the worker allows several days to elapse between the time of injury and reporting to the physician, one may usually assume that the sensation of foreign body was due to the onset of inflammation and not to injury. Mention is made of mistaking pigment spots on the iris for foreign bodies. The value of slit lamp examination in differentiating true foreign bodies from artefacts is stressed. Several cases are reported where difficulty was encountered in deciding whether a foreign body was present or not.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

PHYSICAL EFFICIENCY: ITS DEVELOPMENT IN RELATION TO INDUSTRIAL EMPLOYMENT. *H. M. Holt. Jour. State Med., July, 1930, vol. 38, pp. 396–405.*

The Greeks excelled at physical training in youth and also attained mental excellence of adults. Modern elementary education aims at training the mind, although most pupils must later on face a life of physical effort in industry. Those who need to use their bodies most, say in unskilled labor, are trained least in bodily exer-

cises. At best a dusty playground is used and indoor clothes are worn; no change rooms or baths are provided. In fact, no instruction is given in the hygiene of the body, which in its turn reacts on mental development. Every child should be fitted for the physical strain of work; he should be taught how to move weights and apply force in order to give maximum performance with the minimum development of fatigue. Mentality may be stimulated by sensorial exercises of eye and ear, like ball games and marching to music. A poorly developed chest may be opened out by breathing exercises. Posture, gait, and muscular tone should be objects of education, as much as mental reaction, since the object of education is to prepare youth for the work of life. Ability for physical effort lessens fatigue and aids maximum performance, while minimizing lost time, accident tendency, and spoiled work. Accident tendency, often associated with bodily laziness and clumsiness, should be detected in the pupil and, if possible, eliminated. Each child can be, and should be, taught how to obtain health and how to maintain it.—E. L. C.

APPARATUS FOR THE STUDY OF RESPIRATORY QUOTIENT AND BASAL METABOLISM OF MICE. *A. H. Ebeling and R. B. Corey. Abstr. as follows from Jour. Exper. Med., 1930, vol. 51, pp. 41–50, in Chem. Abstr., Feb. 20, 1930, vol. 24, p. 877.*

A simple apparatus has been developed for the study of the respiratory quotient and basal metabolism of mice. Data are given which indicate that the values for the respiratory quotient obtained are accurate to within 0.02. The apparatus is especially designed for rapid routine manipulation.—P. D.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

ABNORMALITIES PRODUCED IN THE CENTRAL NERVOUS SYSTEM BY ELECTRICAL INJURIES. *O. R. Langworthy. Jour. Exper. Med., June, 1930, vol. 51, pp. 943–964, and 3 plates (22 figures).*

The alternating and continuous circuits produced different types of lesions in the central nervous system. Hemorrhages were common after alternating current shocks and few hemorrhages were observed in the continuous circuit group. With both types of circuits at 1,000 and 500 volts potential, severe abnormalities in the nerve cells were observed. These were more marked in the continuous circuit group. A uniformly staining, shrunken, pyknotic nucleus was taken as a criterion of nerve cell death. The Purkinje cells of the cerebellum were most susceptible to the current. Injured cells were studied in the dorsal nucleus of the vagus, in the somatic motor group, among the primary sensory neurones, and in the olives. Changes in the histologic structure of the cells in reference to recovery have been discussed.

Injury to the cerebral and cerebellar cortices occurred on the dorsal surface close to the head electrode. Small cavities were produced, particularly in the cerebral cortex, as the result of the circuit contact.

With the continuous and alternating

circuits at 110 and 220 volts potential, less severe changes were observed in the nerve cells although hemorrhages were common in the alternating circuit group. It must be assumed in these cases that death was due to respiratory block rather than actual death of the cells.—*Author's Summary.*

DEATHS FROM ELECTRICITY. *H. Edenhofer. Abstr. as follows from München. med. Wchnschr., Aug. 30, 1929, vol. 76, pp. 1457–1459, in Bull. Hyg., Feb., 1930, vol. 5, p. 173.*

Many false views are held today by electrical engineers and doctors regarding the causes of death from electricity. It is often held that low tensions of 110 to 120 volts are not fatal, while high tension currents cause certain death. There are, however, many cases recorded in literature which disprove this view. Quite a number of deaths have been recorded from 110 volts, and even from 60 volts and 46 volts; on the other hand, a current of 25,000 volts may not cause death. Many factors play a part in addition to the electric shock, such as personal tolerance and resistance lowered by disease. The resistance of the skin to the electric current plays a large part, and has been found normally to lie between 50,000 and a million ohms, but with perspiring hands and feet, this resistance falls to a few thousand ohms. The quantity and the composition of the sweat is also important, as well as the fact that the hands are often begrimed with metallic dust. There is also to be considered the intelligence of the man and his electrical knowledge.

Four types of death from electricity are described: (1) sudden; (2) protracted; (3) interrupted; and (4) delayed. In the sudden form, which is the commonest, death occurs without the victim calling out for help; in the protracted form the victim calls for help, and death does not occur for a few minutes; in the interrupted form there is, a few seconds after the contact, a period of apparent recovery followed by loss of consciousness passing on to death; in the delayed cases, which are very rare, the symptoms do not come on for some hours or days after the contact. The pathologic conditions found postmortem after any type are very various: In some cases the conditions point to suffocation, in others to edema of the brain and lungs, and the condition of status thymicolymphaticus has often been stated to exist. Many authorities, however, maintain that the cause of death is a spasmodic contraction of the heart.

There is need for further education of the worker, greater fencing of dangerous places, and more special inspectors.—A. J. C.

FIRST AID IN INJURIES CAUSED BY ELECTRIC CURRENT. *D. Pometta. Abstr. as follows from Schweiz. med. Wchnschr., Jan. 25, 1930, vol. 60, p. 82, in Jour. Am. Med. Assn., April 5, 1930, vol. 94, p. 1101.*

Pometta advises that a person injured by an electric current be removed at once from the danger zone in order to be protected against further injuries. He should be placed in the proper position and breathing exercises begun immediately. It is advisable to remove the clothing from the upper part of the body. However, care

should be taken that the body is warm. When the physician arrives the respiratory exercises should not be interrupted in order to permit a diagnosis. He should immediately give a subcutaneous injection of a restorative medicine. Then an examination should be made in order to determine whether intravenous or intracardiac injection is necessary. Concerning the artificial respiration, the author states that manually performed exercises are better than those that are done with apparatuses. However, if the persons who perform the exercises become too tired, an apparatus should be employed. Artificial respiration has to be continued for at least four or five hours. Good results have also been obtained from the breathing of carbon dioxide. —K. R. D.

STUDIES OF VENTRICULAR FIBRILLATION CAUSED BY ELECTRIC SHOCK. II. CINEMATOGRAPHIC AND ELECTROCARDIOGRAPHIC OBSERVATIONS OF THE NATURAL PROCESS IN THE DOG'S HEART. ITS INHIBITION BY POTASSIUM AND THE REVIVAL OF COORDINATED BEATS BY CALCIUM. *C. J. Wiggers. Am. Heart Jour., Feb., 1930, vol. 5, pp. 351–365.*

1. The natural course of events from the onset of fibrillation following faradic excitation to complete diastolic rest was studied by recording electrocardiograms and moving pictures simultaneously. In addition, intraventricular pressure curves were optically recorded during a number of experiments. The changes taking place when fibrillation was inhibited by intraventricular injections of 5 per cent. potassium chloride and the process of recovery following similar injections of 5 per cent. calcium chloride solutions combined with massage, were investigated by the same means.

2. Fibrillation induced by faradic stimulation continues naturally for fifteen to fifty minutes and may be divided into four stages, on the basis of surface changes, electrocardiographic deflections, and intraventricular pressure variations.

3. The initial stage of tachysystole lasts less than one second and is characterized by the spread of rapidly recurring but coordinated contraction waves, by large electrocardiographic deflections with steep gradients, and by definite if small intraventricular pressure variations.

4. The second stage of convulsive incoordination ordinarily lasts fifteen to forty seconds and is characterized by rapid irregular localized contractions which spread short and variable distances over the heart. They are accompanied by large electrical deflections, 600 or more per minute, which vary considerably in size, amplitude, and contour.

5. The third stage of tremulous incoordination ordinarily continues two or three minutes and is characterized by multitudes of irregular yet forceful shivering or trembling motions, each spreading very short distances and with highly variable frequencies over different surface regions. They give rise to small irregular electrocardiographic oscillations having frequencies between 1,100 and 1,700 per minute, and are capable of increasing the intraventricular pressure level slightly.

6. The fourth stage of atonic incoordination is characterized by feeble wavelets of contraction spreading irregularly and at slow rates over small

areas until more and more areas become quiescent, and finally the very slightest movements remain in a few areas only. The electrical deflections perhaps become slightly more regular in contour and spacing, but their amplitude becomes progressively smaller, and their frequency is gradually reduced to 400 per minute or less.

7. Potassium chloride injected into both ventricular cavities does not modify the stages through which fibrillation naturally passes; it merely hastens the process so that fibrillation stops within an average period of 2.4 minutes.

8. Intraventricular injections of calcium chloride after potassium inhibition combined with massage, first inaugurate a coordinated idioventricular rhythm, characterized by slow waves of contraction sweeping over the two ventricles asynchronously but in coordinated fashion. After a short interval, a supraventricular rhythm is reestablished, the electrocardiogram regaining all its normal characteristics. —*Author's Summary.*

THE RECOVERY OF THE HEART IN ELECTRIC SHOCK. *D. R. Hooker. Abstr. as follows from Am. Jour. Physiol., 1929, vol. 91, pp. 305–328, in Chem. Abstr., March 20, 1930, vol. 24, p. 1425.*

Ventricular fibrillation is thought to be the most common cause of death from electric accidents. The treatment proposed is to abolish this fibrillation by an injection, through the central carotid, of potassium chloride solution. This potassium inhibition is then overcome by washing from the coronary bed the excess of potassium and substituting a relative excess of calcium chloride, the effect of which is to stimulate a normal cardiac rhythm. A number of successful treatments on dogs are described.—P. D.

CLIMATE

STUDIES IN CHILLING. PART III. *W. Bachmann. Arch. f. Hyg., Nov., 1929, vol. 102, pp. 263–286.*

This interesting article contains data on the physiologic response of human and animal subjects to various chilling stimuli, such as cold water, wind, snow, or a combination of these. The purpose was to throw some light on the high morbidity from diseases which are supposed to be due to chilling, during the cold winter months. As was the case with all other similar studies, the author did not get very far with his purpose; nevertheless, his findings should be of considerable interest to the hygienist and the public health official. The most important findings are summarized as follows:

The drop in skin temperature, which results from local application of cold stimuli, was found to extend over remote areas of the body, although quite often this consensual reaction disappeared while the stimulus was still on. The rate at which the skin temperature returned to normal depended primarily upon the heat content of the surrounding air. Microscopic observations showed that the skin capillaries returned to their normal condition, which existed prior to chilling, when the finger temperature had reached 30°C.

Local chilling of the nape of the neck failed to show any definite consensual reaction of the nasal mucous membrane, but when healthy persons were exposed to either cold or hot environments, definite changes in the swelling of the nasal mucous membrane could be detected.

Exposure to cool environments increased the basal metabolism, even when the subjects were unable to perceive differences in temperature. Within the comfort zone, the metabolism remained unchanged. Wet feet increased the metabolism, within the comfort zone, but on exposure to cold atmospheres such a local chilling did not add its influence upon the metabolic rate.

In a few instances, prolonged chilling brought about a slight decrease in the opsonin content and in the bactericidal powers of the serum of men and animals. No significant changes could be detected in the blood itself or in the resistance of the red blood cells, or in the hemolysin or the complement content.

Two groups of guinea-pigs, one of which was probably injured from infective agents in another study, were exposed to a cold environment for several months. The majority of the infected animals died from pneumonia. Similar experiments with rabbits showed negative results, although some of the rabbits developed transitory colds.

No definite conclusions are given which would explain the high morbidity from disease during the cold winter months.—W. O. K.

INDUSTRIAL ENVIRONMENTAL CONDITIONS

Fundamental Principles in Air Conditioning. *C. A. Bulkeley. Chem. and Metall. Engin., Dec., 1929, vol. 36, pp. 734–736.*

This is a brief résumé of the psychrometric principles underlying the theory and practice of general air conditioning.—C. P. Y.

How to Improve Atmospheric Conditions in Textile Mills. *C. Badham, H. E. G. Rayner, and H. D. Broose. Studies in Indust. Hyg., No. 15, Rep. Dir.-Gen. Pub. Health, New South Wales, for 1928, Section I.-E, Indust. Hyg., pp. 53–71. Sydney, 1930.*

This section of the report describes an attempt made to ascertain the atmospheric conditions necessary to make work at high temperatures and humidities reasonably comfortable for acclimatized and suitably clothed male and female operatives in the textile mills of Sydney.

The optimum conditions for carrying on the various processes, the character of the mill buildings, the mill atmospheric conditions, the causes of high temperatures in the textile mills, and methods of obtaining satisfactory mill conditions are described.—C. E. B.

Effect of Abnormal Air Conditions on Mine Workers. *R. R. Sayers. U. S. Bur. Mines, Information Circ. No. 6245, 1930, pp. 22 (mimeographed).*

This is a valuable summary of recent investigations (1928 to 1930) made in this country and abroad, dealing with

the problems of silicosis, abnormal air conditions, and toxic gases found in mines.—C. P. Y.

Recent Developments of Window Materials and Fabrics for Transmitting Ultra-Violet Radiation. *W. W. Coblentz. Abstr. from Glass Industry, 1929, vol. 10, pp. 233–236, in Chem. Abstr., March 20, 1930, vol. 24, p. 1294.*

The ultraviolet light shut out by window glass is estimated to be 0.3 per cent. or about 0.004 gm.-calorie per square centimeter per minute. The percentage transmission of various glasses at 3022 is given for both new and exposed specimens. Similar data are given for fabrics, miscellaneous materials, and for the reflective properties of paints.—P. D.

Artificial Industrial Illumination. *L. B. W. Jolley and G. H. Wilson. Jour. Roy. San. Inst., Nov., 1929, vol. 50, pp. 337–346.*

The case for good illumination is usefully summarized. The effect on workers is stated and the economics are displayed, both to the advantage of a high standard of lighting. The influence on production is instanced from letter sorting at New York and Chicago, and also from a printing works in London. Stress is laid on the need for maintenance and testing. —E. L. C.

Illumination in the Rayon Manufacturing Industry. *D. H. Tuck. Abstr. as follows from Textile World, 1929, vol. 76, pp. 1844–1845, in Chem. Abstr., March 20, 1930, vol. 24, p. 1517.*

A description is given of two new reflectors designed to give the proper type of lighting for the spinning operation and for the throwing, coning, reeling, and twisting machines.—P. D.

Experiments on the Soundproofing of Ceilings and Walls. *Nuck. Abstr. as follows from Arch. f. Hyg., Jan., Feb., March, 1930, vol. 103, pp. 189–205, in Bull. Hyg., May, 1930, vol. 5, p. 424.*

The experiments here described were performed in the laboratory, using a standard loudspeaker as the source of sound. A phonometer was used as a sound detector. The investigations aimed at determining the relative values of different types of construction of ceilings and of walls and of various kinds of floor covering. Such work as this should be of considerable value to those engaged in the design and building of houses and laboratories.—M. E. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

First Aid Service in Small Industrial Plants. *Metropolitan Life Insurance Co., Indust. Health Series No. 1, pp. 20.*

This publication sets forth concisely the need of first aid facilities within industrial plants of all sizes; the desirability, in all plants, of provision for more extensive medical and surgical care; and the conditions determining the appropriate scope of first aid and other dispensary service in plants of various sizes.

Plants of 500 or more workers gener-

ally find it advantageous to equip first aid dispensaries and to provide some degree of medical and surgical care for workers. In establishments with less than 500 employees, the aggregate of whose workers exceeds that of the larger plants, medical and surgical treatment beyond first aid is no less desirable than in the larger plants; but the per capita cost is relatively more. Hence in the smaller plant it is usually advisable to limit dispensary service quite literally to *first aid*.

One section of the publication considers the legal aspects of industrial first aid service. Existing state laws and regulations are so varied that few generalizations can be made. As an aid in this difficulty a summary of state and provincial laws is appended. An important safeguard against possible legal complications in industrial dispensary service is scrupulous observance of the general principle of all these laws—namely, that medical and surgical treatment is limited to licensed physicians *except in emergency*.

Other sections outline the considerations determining size, location, and other structural details of the first aid quarters; factors determining appropriate equipment and supplies; and suggestions for the selection and training of personnel. Photographic reproductions illustrate the layout of typical first aid rooms in several small plants. A simple system of making and filing records of first aid service is briefly described.—H. W. S.

Eye Examination Record and Topographic Chart. *M. Davidson. Am. Jour. Ophth., April, 1930, vol. 13, pp. 323–325.*

The examination record blank presents a suggested routine of examinations to serve the needs of ophthalmologists engaged in industrial and compensation work; while the topographic chart provides for some details not commonly included in such charts, especially as to the relation between the eye and the orbit and as to inclusion of the whole of the ophthalmoscopically visible fundus.—*Author's Summary.*

INDUSTRIAL INVESTIGATIONS AND SURVEYS

Statistical Survey of Ocular Injuries Observed during the Last Decade at the Bratislava Ophthalmic Clinic. *Solarikova. Abstr. as follows from Bratisl. lekár. listy, Dec., 1929, p. 1252, in Am. Jour. Ophth., April, 1930, vol. 13, p. 371.*

This report classifies 3,244 ocular injuries, comprising 7.7 per cent. of all patients, relative to their etiology, type of injury, complications, and visual results; 71.66 per cent. were occupational injuries, 18.7 per cent. perforating injuries, and 3.9 per cent. burns. In comparison with the author's statistics the German and English statistics show a higher percentage of burns, and a lower percentage of perforating injuries.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

A Study of Fruit Sorting. *D. W. Harding and W. H. O'N. Manning. Jour. Nat. Inst. Indust. Psychol., Oct., 1929, vol. 4, pp. 423–432.*

In the sorting of strawberries and currants at a fruit sorting factory, each worker had two trays in front of her, one filled with unsorted fruit, the other destined for first-grade fruit, while a basket at the end of the unsorted tray was intended for second-grade fruit. Waste, such as stalks, was left in one corner of the unsorted tray. It was found that some sorters had more than double the output of others; this was partly because there were no special instructors, other than the foremen, who gave very brief tuition. Special supervisors or instructors were therefore appointed to show the sorters how to carry out the work efficiently. The slow workers, who were accustomed to pick up first-grade and second-grade strawberries haphazard, just as they came to hand, were instructed to make "runs" first on one grade of fruit and then on the other. Also, the sorters were instructed to use both hands as much as possible, each for a particular movement. Special labor was introduced for supplying unsorted fruit and for removing sorted fruit, instead of leaving these jobs to the sorters, and adequate rest pauses were introduced into each work spell in order to compensate for the more rapid and continuous work. Black currant sorting was found to be monotonous because the full tray of fruit supplied to each girl was so big that it took her nearly the whole day to sort. When the girls were given only half a trayful at a time, which could be coped with fairly quickly, they doubled their output in most cases and avoided boredom.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

The Vertebrae Roentgenologically Considered (Including a Study of Industrial Accident Cases). *A. W. George and R. D. Leonard. Vol. VIII of Annals of Roentgenology: A Series of Monographic Atlases. New York, Paul B. Hoeber, Inc., 1929, pp. 256.*

Reviewed in Jour. Am. Med. Assn., Nov. 2, 1929, vol. 93, p. 1411.

The extensive experience of the authors in industrial accident cases has given them an abundance of material. Therefore the volume is of especial interest and value to those engaged in roentgen practice dealing with cases that come under the workmen's compensation acts of the several states. It fills a gap in English literature on the X-rays that has long needed filling in this age of high speed, intensive industrial activities. Here is a book that will serve to reduce many of the errors of interpretation of roentgenograms of the spinal column which have been all too frequent in the past.

The authors are to be commended for the splendid section on pathologic

conditions of the vertebrae. The interesting condition known as Kümmell's disease is given considerable space in which they do not accept Kümmell's hypothesis as to the etiology of the lesion. They believe that this lesion is always due to an actual and roentgenographically demonstrable injury to a vertebral body and consider it a compression fracture at the time of the initial injury, and believe that Kümmell's presumptive evidence of no roentgenographically demonstrable bone injury would have been shown to be in error had a technically correct roentgen examination been made immediately after the injury. There are others who believe as do George and Leonard, but the majority of those interested in this condition still adhere to Kümmell's hypothesis.

Another interesting section is that on spondylolisthesis, which they consider more as a congenital defect or as a congenital weakness predisposing to the condition rather than as an acquired slip in the sense of a dislocation produced by force. They support this by valid evidence found in children who have the lesion but who never were injured. Still another interesting section is that dealing with so-called infectious arthritis or spondylitis. They hesitate to use this term, believing it to be misleading in most cases. Apparently they adhere to Sir Arbuthnot Lane's belief that vertebral lipping is due to reactive changes as the result of occupational stresses. They also contribute a paragraph on tuberculosis of the fifth lumbar bone, a condition which many osteologists have never seen.

A chapter on industrial back cases is contributed by Dr. John D. Adams which is decidedly apropos, but one wonders why he concludes with the statement that "until we at some time may check up our findings by pathological examination, we are not justified in mentioning either to our patient or to the board of arbitration the existence of roentgen findings that occur in a sufficiently large number of normal cases to warrant their being placed in the category of anatomical variation or chronological age changes." In certain cases the psychologic effect on an arbitrator and the opposing lawyers of failing to report the existence of such conditions would be bad, giving the impression that the defendant was covering up, although it is conceded that these changes may not be causative factors of symptoms complained of or related to the alleged injury.

In an appendix George and Leonard give a presentation on medicolegal expert testimony that should be read by every physician who may be called in court proceedings, be he roentgenologist or any other specialist in medicine or surgery.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

REPORT OF THE MEDICAL RESEARCH COUNCIL FOR THE YEAR 1928–1929. *H. M. Stationery Office, 1930, pp. 153.*

This report sets out the wide scope of the work now being done for investigating the causation and cure of disease. The sixth section of the report deals with industrial health research. The subjects mainly concerned were miners' nystagmus, the effects produced by experimental dust inhalation, and the respiratory response to carbon dioxide. The incidence of sickness among printers has been investigated with special reference to their tendency to develop tuberculosis. Similar work is being done among operatives in spinning mills. Sickness absenteeism in industrial and clerical establishments is under investigation. The physiology of load carrying by dock and transport workers is being looked into. The effects of age on the acquisition of dexterity are being investigated, as well as several other matters dealing with industrial psychology, such as the personal factor in accident proneness and proficiency. Other industrial investigations include the subjects of heating and ventila-

tion, absenteeism among coal miners, manual repetition work and monotony, labor turnover, and ultraviolet radiation.—E. L. C.

FOURTH CONFERENCE ON INDUSTRIAL HYGIENE, MARCH, 1930. COMMONWEALTH AND STATES OF AUSTRALIA. *Canberra, 1930.*

A summary is presented of work related to occupational hygiene recently carried out either federally or by individual states. Particular attention is directed to the electric accumulator industry, industrial cancer, chrome plating, freezing machinery and compressed gas containers, and to a standard lighting code. The report, being a summary, does not lend itself to abstract.

There are four appendices to the report. The first is an analysis of 982 industrial accidents to minors, of which machinery was the agency in 41.6 per cent. of the cases among males, and in 63.5 per cent. of the cases among females. These are unusually high proportions. The chief point emerging was the large percentage, 74.5, resulting from want of care; such accident frequency calls for educational measures.

The second appendix is a survey of industrial medical services in Australia. There are Commonwealth medical officers at the post offices of Sydney and Melbourne. The railway and tramway services of New South Wales, South Australia, and Victoria have medical departments. A part or whole time physician or trained nurse was found employed by forty firms; first aid for accidents and sickness is rendered, and compensation cases are assessed. Examination prior to engagement is not practised generally. The accommodation provided varied from one room to five. Favorable comments on the value of the work were usual, and the service seems likely to be more widely adopted.

The third appendix deals with twelve months' experience with the kata-thermometer which is found of definite use; but standards of cooling power suitable for Great Britain are too high for Australia, owing to acclimatization to atmospheric conditions.

The last appendix presents a safety code for refrigerators which is adopted from that in force in New York City. It is aimed at preventing accidents due to escape of refrigerants, such as methyl chloride, which are anesthetic and toxic.—E. L. C.

ANNUAL REPORT OF THE CHIEF INSPECTOR OF FACTORIES AND WORKSHOPS FOR THE YEAR 1929. *H. M. Stationery Office, 1930, pp. 173.* (*Cmd. 3633.*)

Factories again increased in number to 152,453, while workshops decreased to 108,323. The tendency for expansion to occur in the southeast and leave the north continued; the textile trades were severely depressed. Notwithstanding a safety campaign, accidents increased in number to 161,269 with 982 deaths; over 10 per cent. of the accidents were due to sepsis. Instances are quoted of good results from organized safety work, lowering frequency rates of 85.6 in 1927 to 67.7 in 1929, of 96.9 to 78.5, of 99.2 to 54.6, and of 49.1 to 34.5. Only 20 per cent. of accidents were due to moving machinery; 80 per cent. were caused by such personal reasons as

falls, struck by falling body, handling goods, and use of tools. The 80 per cent. are only to be attacked by personal care inculcated by safety first methods.

Progress made in all the large industries is described. But some men seem made to kill themselves; a foreman steel erector was walking on an 18-inch steel girder at a height of 75 feet from the ground. He was reading a plan, and, not watching his steps, walked off the end of the girder. The introduction of abrasive wheels until extremely few grindstones are left is a great health step; another is the use of leadless or low solubility glaze in the potteries; while dry rubbing down in the painting industry is dying away. Chromium plating creates a new hazard from corrosive fumes, but it is being adequately controlled. Conjunctivitis in making artificial silk has called for special efficient ventilation; in three months it caused 230 cases with a loss of 1,555 working hours. Lighting was further studied; yellow glass was found to drive away flies and is recommended for food stores. No definite conclusions have been drawn from using Vitaglass in factories.

Progress is reported in provision of welfare amenities, particularly for supplying food. Dressing stations for fish curers are doing good work; at one, 11,561 dressings were done in two months, chiefly for salt sores. An account is given of the good purposes which are being served by the Home Office industrial museum in exhibiting safety appliances, ventilation apparatus, illumination, and welfare needs; it is a center from which education is emanating. Foolproof electrical apparatus is a good instance; here, while the use of electric energy has increased over 100 per cent., accidents have increased only 8.5 per cent. The alternating current is more dangerous than the direct current of equal pressure. Many instances are given of accidents resulting from culpable negligence in handling live conductors.—E. L. C.

REPORT OF THE SENIOR MEDICAL INSPECTOR. *J. C. Bridge. Ann. Rep. Chief Inspect. Factories for 1929. H. M. Stationery Office, 1930, pp. 73–98. (Cmd. 3633.)*

Ever more as years pass does this annual report deal with subjects of wider scope than industrial poisonings. Dr. Bridge calls it the dust age of industrial medicine; silicosis, asbestosis, card room dust, and lead dust are examples of dust hazards. Plumbism is receding into the background; only 169 cases were recorded from factories, as against 505 in 1910, and 1,058 in 1900. House painting is today the remaining stronghold of this occupational disease. The use of carbon bisulphide at an artificial silk works caused some serious cases, one being acute mania; two cases of toxic jaundice resulted from exposure to fumes of tetrachlorethane—a solvent which should be prohibited. Infection from hides and skins caused most cases of anthrax; all endeavors so far to eliminate this risk by any measure of disinfection have failed, but research is being continued.

Skin cancer from exposure to pitch, tar, and mineral oil continues to be an important disease; 165 cases with fifty deaths were recorded. Fortunately, the causation is well understood; clean-

liness and the establishment of periodic medical examination should bring the risk under control. A kindred trouble, dermatitis, is receiving special note; it occurs more among men than women, 77.7 per cent. of the reported cases being males. The originating substances are many: chromic acid and chromium compounds, acid hypo, lubricants, and cooling fluids are instances. Prevention lies in care of the skin and avoidance of contamination.

A summary is given of the incidence, symptoms, and pathology of asbestosis as ascertained by an inquiry in which 374 workers were examined. The disease may develop in seven to nine years, causing complete disablement and death without superimposed tuberculosis; it results from a diffuse pulmonary fibrosis uniformly damaging the lung.

Cases of gassing by carbon monoxide were rather more numerous, and due mostly to contempt of danger arising from familiarity—tragedies often caused by one man, gassed through carelessness, jeopardizing the lives of others who attempt a rescue. Particulars are given of six unusual gassing cases due to nickel carbonyl, with headache, retrosternal soreness, inability to breathe deeply, and a purposeless cough; details of the blood picture in each case are presented.

The incidence of sepsis in reported accidents was as high as 10 per cent.; this proportion is far too high since many accidents are not wounds. At least half of the cases did not seek first aid treatment. Skill and knowledge of ambulance work are steadily extending.—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

Respiratory Apparatus. *L. Deladriere. Abstr. as follows from Hyg. Travail, No. 100, Ztschr. f. d. ges. Schiess- u. Sprengstoffw., 1929, vol. 24, pp. 110–113, 149–152, 193–196, in Chem. Abstr., March 10, 1930, vol. 24, p. 1166.*

The various types of industrial gas masks are described with data on construction, applicability, methods of testing, storage, etc. The masks described are mainly American and French, and the bibliography is derived mainly from American and French sources.—P. D.

Gas Masks (Gas Protection Apparatus) with Closed Circuit. *O. Schwenninger. Abstr. as follows from Ztschr. d. Ver. deutsch. Ing., 1930, vol. 74, pp. 338–342, in Chem. Abstr., June 10, 1930, vol. 24, p. 2814.*

Various forms of (German) gas masks are described and illustrated. In them oxygen is supplied in tanks; the products of respiration are absorbed (as with potassium hydroxide); the passage of inhaled and exhaled air is controlled by suitable valves; and the inhalation of gas or dust laden air is minimized.—P. D.

The "Spasny" Inhalator Apparatus. *F. Schmid. Abstr. as follows from Montan. Rundschau, 1929, vol. 21, pp. 412–415, in Chem. Abstr., March 10, 1930, vol. 24, p. 1166.*

A description of an apparatus con-

taining potassium hydroxide cartridge, oxygen cylinder, reducing valve, and accessory parts, designed especially for life saving work, use in mines, etc.—P. D.

PHYSIOLOGIC RESPIRATORY INVESTIGATIONS ON CARRYING OF GAS MASKS. IV. DOES LONG CARRYING LEAD TO INCREASE OF RESISTANCE IN THE FILTER? *Englmann and Quednau. Abstr. as follows from Arbeitsphysiol., 1929, vol. 1, pp. 625–638, in Chem. Abstr., June 10, 1930, vol. 24, p. 2814.*

The increases in weight of parts and changes in resistance to inspiration and expiration were determined with a Degea 760 gas mask during rest and work. The results showed an increase in the resistance of the filter after long use, due to water vapor in the expired air. The increase at rest is not significant, but during work, may soon cause an insufficiency of ventilation, especially with an untrained subject.—P. D.

OCCUPATIONAL ANILISM AT CERTAIN PROCESSES OF PHARMACEUTIC CHEMISTRY. *F. H. de Balsac. Méd. du travail, July, 1930, pp. 285–290.*

An investigation is reported into the manufacture of sodium arsanilate, or atoxyl; it results from the action of arsenic acid on aniline at 100°C. Aniline while cold, even though handled freely, was not found to be toxic; contrary to expectation no absorption through the skin was observed. Heated aniline caused trouble, and although care was taken to prevent fumes from escaping into the atmosphere, cases of anilism occurred. Only seven men were employed at any one time; but 150 had passed through the workshop in eight years. No fatality had occurred; cases of illness lasted from a few hours to three weeks. Cyanosis, dizziness, headache, and nausea were present, and in severe cases, fainting. Examination of nine men who had been affected did not disclose any characteristic lesion, not even in the blood picture.—E. L. C.

THE PATHOLOGY OF ANILINE POISONING. *G. Aiello. Méd. du travail, July, 1930, pp. 294–296.*

THREE CASES OF INDUSTRIAL POISONING BY ARSENIURETTED HYDROGEN. *R. Blondel. Méd. du travail, 1930, vol. 1, pp. 136–144.*

An interesting note is given on three cases of poisoning by arseniuretted hydrogen, which occurred during smelting tin ore. Apparently among the impurities present there may be arsenic in combination with aluminium. When such a combination is mixed with water, a reaction takes place, with evolution of the poisonous gas and the formation of oxide of aluminium. In hot weather the men, inconvenienced by dust and heat, quenched the molten material they were moving with water, whereupon fumes were evolved; three of them were so overcome as to be removed to a hospital. Two of these men died, one after five days and the other after six. The third was less severely gassed, and recovered after three weeks. The exact cause of the poisoning was not recognized until after death, when the tissues were examined; but the symptoms experienced were later recognized as typical of poisoning by arseniuretted hydrogen, with acute abdominal pain, jaundice, and suppression of urine. Arsenic was found both in the lungs and in the

liver. Generally this gas betrays its presence by its characteristic odor, which, however, when it is suddenly evolved is not sufficient warning to protect workers.—E. L. C.

TREMOR IN INDUSTRIAL POISONING BY CARBON BISULPHIDE. *G. B. A. Gianotti. Abstr. as follows from Riforma med., 1929, vol. 45, pp. 1275–1278, in Bull. Hyg., March, 1930, vol. 5, p. 251.*

Nervous symptoms occurring in carbon bisulphide poisoning may be those of a polyneuritis, or of the parkinsonian syndrome of encephalitis lethargica. The author has seen cases of this intoxication among operatives in the artificial silk industry and describes one—a man of 39—in detail. Symptoms first appeared six months previously with gastric discomfort, pain, and acid dyspepsia, relieved by alkalies. Two months later he complained of sensory disturbances of the legs and soles; these sensations subsequently involved the arms, first the left, then the right, with tremor. When the arms were quite at rest the tremor ceased, but movement started it again and purposive movements of the fingers brought on the pill-rolling action of paralysis agitans. Some of the small muscles of the left hand (the one more affected) were hypertrophied. The left sciatic (external popliteal branches) gave signs of hypo-excitability, namely, AOC>ACC>KCC. The differences between tremors of various origins are discussed, but add nothing to what is stated above, that in this intoxication they closely resemble those of parkinsonian encephalitis, though the author is careful to note that he does not by this statement intend to commit himself to the opinion that pathologically they are identical; that is, the lesion in carbon bisulphide poisoning is not necessarily central.—H. H. S.

NEUROLOGIC CHANGES FOLLOWING CARBON MONOXIDE POISONING. REPORT OF A CASE. *R. P. Mackay. Jour. Am. Med. Assn., May 31, 1930, vol. 94, pp. 1733–1736.*

Following acute carbon monoxide poisoning, parkinsonism developed in a previously normal person, with increased tonus of the skeletal musculature, "cogwheel phenomenon," masked facies, monotonous speech, rhythmic tremor of the head and hands, mental decline, and early scleroderma.

A study of the literature on the clinical and experimental aspects of the condition reveals that the nervous system is the seat of highly variable and complicated degenerative changes, and that these changes are the result of functional and organic vascular disturbances dependent on anoxemia. It is suggested that oxygen deprivation also produces parenchymatous neurologic alterations by direct action on the nervous tissue.—K. R. D.

DOES CARBON MONOXIDE COMPLETELY INHIBIT RESPIRATION? *O. Warburg and F. Kubowitz. Abstr. as follows from Biochem. Ztschr., 1929, vol. 214, pp. 19–23, in Chem. Abstr., March 10, 1930, vol. 24, p. 1150.*

The inhibition of respiration by carbon monoxide increases with increase in carbon monoxide tension and diminution in oxygen tension. The residual respiration n is therefore: $n/\ (1 - n)\ (P_{CO}/P_{O_2}) = K$, and the constant is determined when cell sus-

pensions are shaken with mixtures of carbon monoxide and of oxygen; the residual respiration is measured while the P_{CO}/P_{O_2} in the gas chamber is known. Experiments were carried out in which this ratio = 1,000, *i.e.*, the oxygen tension was only 0.001 atmosphere. It is pointed out that the inhibition of respiration through carbon monoxide is as complete as the distribution ratio makes it possible. Experimentally one can produce an inhibition of 99 per cent.—P. D.

CARBON MONOXIDE POISONING. *S. Schönberg. Abstr. as follows from Deutsch. Ztschr. f. d. ges. gerichtl. Med., 1930, vol. 14, pp. 517–519, in Chem. Abstr., June 20, 1930, vol. 24, p. 3068.*

Case report and discussion.—P. D.

ACUTE CARBON MONOXIDE POISONING WITH VARYING CLINICAL PICTURE. *W. R. H. Kranenburg. Méd. du travail, July, 1930, p. 297.*

OCCUPATIONAL POISONING BY CARBON TETRACHLORIDE. *M. P. Boveri. Méd. du travail, July, 1930, pp. 280–283.*

A healthy man employed for two days in a silk factory, degreasing with carbon tetrachloride, was suddenly taken ill in the night with vomiting, vertigo, and abdominal pains. Urine was suppressed and coma supervened for four days. Pulse was feeble, slow, and irregular; temperature slightly raised; liver enlarged and tender; face slightly cyanosed and eyes jaundiced. Recovery was slow but complete. As carbon tetrachloride is considered non-toxic and is largely used in industry, and as an anthelmintic, this case raises a warning note.—E. L. C.

POISONING FROM ORGANIC DYES USED FOR BOOTS, FABRICS, AND FURS, AS WELL AS FOR MAKING CERTAIN COSMETICS. *A. Kling. Bull. de l'Acad. de méd., June, 1930, vol. 103, pp. 690–695.*

Certain solutions of aromatic amines, which on exposure to the air oxidize and turn black, are used as dyes. Contact with the skin before oxidation is complete may cause poisoning. Four cases, one of which was fatal, are reported due to wearing leather shoes recently dyed; in three cases aniline was found in the dye, and orthotoluidine in the fourth. A further case of interest occurred; it was due to wearing a dress recently dyed black; in this instance the dye was a secret preparation, analogous to the quinophthalones of Swiss origin, known as black setacyl direct R. References are also made to rashes from furs dyed with ursol, and to skin eruptions from the use of lip stick. Personal idiosyncrasy appears in these latter instances to play an important part in the occurrences.—E. L. C.

ACTUAL CONCENTRATIONS OF ETHYLENE IN THE AIR OF THE OPERATING ROOM AND A RAPID METHOD FOR DETERMINING THE SAME. *M. B. Cheney and M. L. Folkman. Abstr. as follows from Anesth. and Analg., 1930, vol. 9, pp. 11–13, in Chem. Abstr., March 20, 1930, vol. 24, p. 1513.*

The determinations were made with a device developed by the Union Carbide Company for the detection of methane and other inflammable gases in coal mines, the only modification necessary being the calibration of the instrument and preparation of conversion tables for use with ethylene-air

mixtures. The danger zone so far as inflammable mixtures of ethylene and air are concerned is confined to an area within a few feet of the exhaling valve of the face mask. The direction in which the exhalation is pointed is an important factor. Ethylene possesses a relatively high rate of diffusion which accounts for the lack of accumulation. Ordinary ventilation is a deciding factor.—P. D.

PHARMACODYNAMIC AND TOXIC PROPERTIES OF OZONE. *J. Dadlez. Abstr. from Med. Doswiadczalna i Spoleczna, 1929, vol. 10, pp. 185–212 (French summary p. 213), in Chem. Abstr., July 10, 1930, vol. 24, p. 3278.*

After the discussion of the action of ozone on various inorganic and organic substances, its application in hygiene and its influence on human and animal organisms is described on the basis of experiments made on dog and man. Concentrations of ozone above 1 mg. in 1 cm. of air cause irritation of the mucous membrane of the respiratory organs. The depression of blood pressure by the influence of ozone is a consequence of the dilatation of peripheral blood vessels; the mechanism of this action is of central origin.—P. D.

TEST PAPER FOR DETECTING SMALL QUANTITIES OF PHOSGENE. *A. Suchier. Abstr. as follows from Ztschr. f. anal. Chem., 1929, vol. 79, pp. 183–185, in Chem. Abstr., March 10, 1930, vol. 24, pp. 1056–1057.*

Directions are given for preparing a test paper from 1 gm. of *p*-dimethylaminobenzaldehyde and 1 gm. of diphenylamine, which will react well with phosgene in the air. The paper is more sensitive than litmus to phosgene but less sensitive to hydrochloric acid.—P. D.

EXPERIMENTAL STUDY OF TARS. THE ACTION OF TAR OBTAINED FROM CRUDE PETROLEUM BY DISTILLATION. *S. Shibata. Abstr. as follows from Acta dermat. (Kyoto), 1929, vol. 14, pp. 81–93 (English summary p. 94), in Ber. ü. d. ges. Physiol. u. exper. Pharmakol., June 4, 1930, vol. 54, p. 446.*

The author experimented with this tar, which is a yellow-brown, sticky substance and smells of petroleum. Three times a week the tar was smeared on the inner surface of rabbits' ears, every care being taken to avoid mechanical injury. At first, only an acute dermatitis appeared, while no epithelial thickening or tumor could be detected. Histologically, hyperkeratosis appeared on the skin, but there was no change in the connective tissue. The somewhat enlarged hair follicles were filled with scales, and a slight cellular infiltrate was seen in the enlarged hair follicles and in the superficial layers of the subcutis. As a control, the "C" component of pityrol was used, which, as shown in a previous experiment of the author, produces cancerous and papular growths sooner than does the tar obtained from crude petroleum.

THE MECHANISM OF THE ORIGIN OF TAR CANCER. *I. A. Pigalew. Abstr. as follows from Ztschr. f. d. ges. exper. Med., 1928, vol. 63, pp. 662–676, in Ber. ü. d. ges. Physiol. u. exper. Pharmakol., Jan. 15, 1930, vol. 52, p. 555.*

A group of local, peripheral processes owe their origin to the fact that certain substances travel along the nerve tracts and reach the brain. Through alteration of the corresponding brain segment, reflected phenomena appear on the periphery as local effects. The author investigated the question whether the origin of cancer following painting with tar can be traced to a similar mechanism. If this is the case, then the latent period would be shortened by increasing the amount of coal tar reaching the brain by means of simultaneous local application, and the appearance of papillomas (or tumors) would be increased according to the intensity of the application. The author has confirmed this in the experiments described. Following tar painting on the ear or injection of tar into the submucosa of the stomach, rabbits received periodic injections of a tar emulsion by means of suboccipital pricking. With the application on the ear combined with the suboccipital injections, the growth of papillomas was more rapid and more marked than in the painted controls; the same was true of the development of adenomas following injection into the submucosa of the stomach. If the central nerve tracts were severed, papillomas or adenomas did not appear with painting alone either on the skin or on the mucous membrane.

NOTE ON SOME CASES OF POISONING BY ZINC FUMES. *Artur. Arch. de méd. et pharm. nav., 1929, vol. 119, pp. 547–559.*

On a number of occasions since 1924, symptoms have been complained of in dockyards by men employed on electric welding of galvanized sheets or treating them with the oxyacetylene flame. Such processes are associated with the evolution of heavy, greenish-white fumes. These fumes are composed of oxide of zinc. The men affected call the trouble zinc fever, while the symptoms experienced are identical with those known under the name of brassfounders' ague. But the author does not appear to be acquainted with the work of Drinker upon metal fume fever, originally reported in THIS JOURNAL. The men, usually after leaving work, are attacked with malaise, shivering, and nausea, accompanied by a rise in temperature. Later the attack ends in sweating, when except for tiredness the man has recovered and is able to resume his work. In exceptional cases of prolonged and intense exposure, more severe attacks are described.

Analyses definitely showed the presence of oxide of zinc in the fumes and upon cotton used in a respirator. No attacks occurred among men welding black plates not coated with zinc. Examination of the blood showed that the red cells remained normal, but there was a tendency toward mononucleosis. Experiments showed that the men at work could be protected by wearing a suitable mask, which filtered the fumes from the air breathed by causing them to pass through a layer of cotton wool soaked in a solution of tartaric acid.

Men employed on other work in compartments where the welding was proceeding, suffered quite as much as those directly employed. The causation of the trouble was so definite that an order for the construction of submarines has been issued, which calls for careful ventilation of all places

where such work is in progress, and for the elimination from such compartments of anyone not directly employed; while those employed are called upon to wear a protecting mask.—E. L. C.

DUST HAZARDS AND THEIR EFFECTS

THE ESTIMATION OF DUST IN MINE AIR. *J. Boyd. Abstr. as follows from Third (Triennial) Empire Min. Metall. Congress, So. Africa, 1930, pp. 23, in Chem. Abstr., June 10, 1930, vol. 24, p. 2691.*

A description of the methods used on the Witwatersrand, and a discussion of the results obtained. Improved results by the gravimetric method have been corroborated by the results of the konimeter samples. Dust content in mine air has dropped, since 1914, from 5 to 1 mg. While no one method of dust determination can be claimed as scientifically accurate, the knowledge gained has led to ways and means of improving air conditions underground and to prevention of the formation of excessive amounts of dangerous dust.—P. D.

A METHOD OF SOOT DETERMINATION. *J. Hirsch. Abstr. as follows from Ztschr. f. Hyg., 1929, vol. 110, pp. 399–412, in Chem. Abstr., May 10, 1930, vol. 24, p. 2220.*

Various methods for the determination of soot in the atmosphere are reviewed. The details of a method are reported which is applicable for determining organic dusts.—P. D.

INDUSTRIAL DUSTS. *M. F. Martin. Mouvement San., June, 1930, vol. 6, pp. 370–382.*

Dusts are harmful; some are microbic and may originate such diseases as tuberculosis or anthrax, while others are toxic, like lead, or irritating like silica. The lungs, skin, digestive tract, eyes, or air passages may be affected. Further, dust inhalation provokes thirst and so tends to alcoholism, while oxidizable dusts, like flour, coal, aluminium, or magnesium, form explosive mixtures with air. French legislation aimed at controlling dusts is quoted in detail and reference is made to dust determinations. Prophylaxis is summarized as personal cleanliness, the application of glycerin to the skin to avoid cracks, the wearing of goggles, the use of respirators, and the nongeneration of dust or the adoption of methods to prevent it from gaining access to the air. Dust may be caught at the point of origin and carried away to a deposition chamber, often of cyclone type, or to be deposited electrolytically as is done when precious metals are present. No method for dealing with dusts should interfere with a worker's manipulations; all exhaust hoods and ducts should be constructed accordingly. Good results have followed legal enactments; further advantage to health would follow spread of knowledge.—E. L. C.

A CONTRIBUTION TO THE STUDY OF OCCUPATIONAL PNEUMONOKONIOSES. *A. Feil. Presse méd., July 12, 1930, vol. 38, pp. 939–942.*

A discussion of dusts is presented,

owing to a French decree, November, 1929, calling upon doctors to notify lung diseases caused by inhaling dusts of silica, lime, clay, or coal. Most efforts to classify dusts are rejected as possessing no pathologic basis. Some dusts are poisonous, like lead and arsenic; some are infectious, like tubercle and anthrax bacilli; some are caustic, like slag; some are soft, like wool and cotton; and others are hard and abrasive. But only silica dust produces a true pathologic fibrosis. The outstanding importance of silicosis has in recent years been displayed by British observers who have shown that in the tissue the silica particles dissolve into a positive colloid with toxic properties, enough of which will kill animals. In man the fibrotic condition takes years to develop.

Anthracosis is a name given to lungs black with coal dust; but it has no pathologic character, unless silica is present in the dust. Siderosis is applied to pneumonokoniosis due to iron dust; but it seems not to exist. Schistosis occurs from slate dust, and is due to the occurrence of silica in slate. There is no evidence to condemn lime dusts, or clay dusts. Up to the present time, silica alone is condemned; and the ministerial decree should be modified accordingly.—E. L. C.

Serious Pneumonokonioses (Silicosis). *Méd. du travail, March, 1930, pp. 98–105.*

A summary is presented as furnished to German doctors when compensation was granted for silicosis in February, 1929. It deals usefully with etiology and with the anatomic and pathologic picture. Three stages in the disease are recognized: slight dyspnea, increasing dyspnea with diaphragmatic breathing, and serious dyspnea and possibly death from cardiac failure. The value of X-rays for diagnosis and the importance of tuberculous infection is made clear. Attention is directed to the importance of preventive measures to minimize the dust risk, especially in industry, by limiting periods of work, by extended annual holidays, by selection of workers, and by periodic examinations. Prognosis is recognized to be generally unfavorable, and particularly so when tuberculous infection has intervened. —E. L. C.

Some Aspects of the Problem of Silicosis among Miners. *C. Garin and A. Policard. Méd. du travail, March, 1930, pp. 88–97.*

The authors review the question of silicosis from the viewpoints of pathology, diagnosis, and its association with tuberculosis. The article is the second of a series devoted to the occurrence of this disease in France. Stress is laid on difficulties and on the need for further observation and research, particularly with regard to the relation of tuberculous infection to silica dust. No new facts are reported.—E. L. C.

Eight Years' Further Observations of Dust Disease of the Lungs Occurring amongst Miners at Broken Hill. *Third Ann. Rep. Workers' Compensation Commission of New South Wales, July 1, 1928 to June 30, 1929. Sydney, 1930, pp. 49–57.*

An account is given of the after history of men who were withdrawn from their occupation as miners and compensated on account of some degree of pneumonokoniosis by the

Technical Commission for Broken Hill in 1920 and 1921. As no periodic examinations are held of those employed, this method of investigation is the only means of estimating the harm wrought by the mining dust. Complete medical histories were available of 368 men out of 373 withdrawn. Since that time, a further 388 men have been placed on compensation, most of whom were passed as normal by the Commission; since the Act commenced, 314 beneficiaries have died. Pulmonary tuberculosis was usually the final cause of death.

A comparison with results in South African miners shows a close similarity; after seven years, of cases classified as simple silicosis there died of the disease at Broken Hill 31 per cent. and in South Africa 29 per cent.; of simple tuberculosis there died 44 per cent. and in South Africa 46 per cent.; and of silicosis with tuberculosis there died 78 per cent. and in South Africa 87 per cent. Such agreement suggests that the disease, once it is produced at Broken Hill, is of the same nature as that found in South Africa. Broken Hill ore contains approximately 17 per cent. of silica, and also other minerals such as galena and blende, which may be fibrogenetic. Another comparison shows that, whereas in South Africa, after seven years, half the cases of simple silicosis have died from or developed overt tuberculosis, the percentage at Broken Hill was 47.5. The number of deaths occurring per annum seems not to be decreasing; and many miners not withdrawn by the Commission have since succumbed to the disease.

The opinion is expressed that the onset of tuberculous infection is the deciding factor in the development of fibrosis in all cases, and that there is a tuberculous element in every case of dust disease. Thus, since all exposed to dust do not succumb, there must be another factor; many cases of simple pneumonokoniosis develop overt tuberculosis, even though under surroundings far from reinfection; and suspicious areas of healed or incipient tuberculosis are to be detected in most radiographs, even of simple pneumonokoniosis. Fine or granular mottling has been watched passing to a coarser stage, and finally to large asymmetrical nodulation and tuberculosis. Increase in size of nodules signifies commencing overt tuberculosis; at the same time weight is lost, cough and dyspnea increase, tiredness develops, and the patient looks badly. An attack of pleurisy is frequently the first clinical sign of overt tuberculosis. Many an industrious man continues at work before applying for examination until he has only a few months to live; such cases infect others.—E. L. C.

RADIOLOGY AT THE BUREAU OF MEDICAL INSPECTION, BROKEN HILL. NINE YEARS' REVIEW, 1920–1929. *W. A. Edwards. Third Ann. Rep. Workers' Compensation Commission of New South Wales, July 1, 1928 to June 30, 1929. Sydney, 1930, pp. 59–60.*

Great advance in the technic of radiography has taken place since it was first used in 1920 at Broken Hill, when glass plates were used and there were no intensifying screens, no automatic timers, and no current stabilizers. But even then useful pictures were obtained. Today different types of fine and coarse fibrosis are recognizable in skiagrams, six of which are well reproduced. One cause of difference

in size of nodules is definitely the percentage of silica present in the dust inhaled; a high percentage causes coarse nodulation, a low percentage causes finer nodulation.—E. L. C.

THE OCCURRENCE OF DISEASE OF THE LUNGS FROM DUST INHALATION IN THE SLATE INDUSTRY IN THE GWYRFAI DISTRICT. *C. L. Sutherland and S. Bryson. H. M. Stationery Office, 1930.*

An account is given of a clinical and radiographic examination of slate workers in North Wales, undertaken to supplement the mortality investigation made in 1927 by Dr. T. W. Wade (see THIS JOUR., 1928, vol. 10, Abstr. Section, pp. 13–14). The slate contains from 25 to 42 per cent. of quartz; and its dust from 40 to 50 per cent. of fine quartz. Those occupationally exposed to inhaling the dust experienced an unduly high mortality from phthisis occurring late in life, associated with high mortalities from bronchitis and pneumonia. Evidence of pulmonary fibrosis was found in 56 out of 120 examined; 47 of this number were millmen, the group most exposed to dust. Definite silicosis was diagnosed in 14 of these men, all of whom had more than twenty years' service in the industry. The evidence corroborates the mortality records and indicates that slate dust is harmful, but takes longer to exert its influence than dust composed wholly of silica. Details of the ages and occupations of those examined are given, and of the method adopted by the investigators for distinguishing stages of silicosis.—E. L. C.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

OCCUPATIONAL ANTHRAX IN GERMANY FROM 1922 TO 1928. *Internat. Labour Rev., May, 1930, vol. 21, pp. 694–700.*

Detailed information is given concerning the occurrence of anthrax in Germany as distributed according to the origin of the risk and the seat of infection. By far the greatest number of cases originated from cattle or their hides, and affected the skin of the upper limbs, neck, or head. The total number of cases among human beings from 1922 to 1928 in Germany was 1,099. Of these only 39 were internal anthrax; but of these 39, 32 were fatal. More than half occurred in agriculture; 502 with 30 deaths, a mortality rate of 5.8 per cent., were due to slaughtering infected animals. In industry, 88 cases with 28 deaths, giving 31.8 per cent. mortality rate, occurred in warehouses and transport of hides and skins; 234 with 28 deaths, giving a mortality rate of 12.8 per cent., occurred in tanneries; 51 cases with 14 deaths, giving a mortality rate of 27.5 per cent., occurred in hair and brush factories; and 15 cases with 11 deaths, giving a mortality of 73.3 per cent., occurred in carpet factories and wool making works. The great differences in case mortality are of interest. Apparently there is some association between a dry infection and high mortality, suggesting that infection by spores is harder to resist than infection by bacilli.—E. L. C.

RELATION BETWEEN POISONING WITH ILLUMINATING GAS AND PULMONARY TUBERCULOSIS. *A. Wolff-Eisner. Abstr. as follows from Ztschr. f. Tuberk., 1930, vol. 55, pp. 491–495, in Jour. Am. Med. Assn., May 3, 1930, vol. 94, p. 1455.*

Wolff-Eisner describes a case of poisoning with illuminating gas followed by the development of a rapidly fatal pulmonary tuberculosis in which he expressed the opinion as a medical expert witness that the poisoning did not play a part in the development of the tuberculosis.—K. R. D.

SILICOSIS AND TUBERCULOSIS. *H. G. Chapman. Third Ann. Rep. Workers' Compensation Commission of New South Wales, July 1, 1928 to June 30, 1929. Sydney, 1930, pp. 57–59.*

Experience gained from eighty chemical analyses of lungs of (1) healthy persons, (2) miners at Broken Hill, (3) quarrymen, stonemasons, and rock choppers, and (4) South African miners justifies the conclusions drawn regarding the relation between preexisting, but quiescent tuberculosis and silicosis. The presence in Broken Hill dust of 15 to 20 per cent. of lead enables the route of inhaled dust to be followed. Even after twenty years of exposure some lungs show no accumulation of silica and no signs of fibrosis; and no regular relation exists between length of exposure and onset of silicosis. The author, however, holds that preexisting tuberculosis is not necessary to the occurrence of silicosis, since the uniform distribution of the pathologic changes characteristic of silicosis is quite foreign to tuberculous infection. The question is left unanswered as to why in many persons particles of silica are absorbed in the lungs without giving rise to silicosis. —E. L. C.

TUBERCULOSIS IN TOBACCO WORKERS. *M. L. Borschtschewsky. Abstr. as follows from Ztschr. f. Tuberk., 1930, vol. 56, pp. 46–49, in Jour. Am. Med. Assn., May 3, 1930, vol. 94, p. 1455.*

On the basis of a statistical study of 1,658 case histories of tobacco workers, Borschtschewsky states that the handling of tobacco does not influence the origin or the development of pulmonary tuberculosis.—K. R. D.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

INDUSTRIAL INJURIES OF THE EAR. *A. Peyser. Abstr. from Beihefte z. Zentralbl. f. Gewerbehyg., 1928, no. 8, pp. 1–23, in Bull. Hyg., March, 1930, vol. 5, pp. 252–253.*

The first section of this memorandum is taken up with a brief statement mainly of the way in which the effect of loud noises is not so much to cause mechanical injury or to interfere with the sound conducting part, as to destroy the sensitive nerve endings in the organs of Corti in the cochlea, which constitute the sound perceiving apparatus.

An important feature in the brochure is a tabular statement in six columns: (1) employment; (2) injurious causes at work; (3) recognized ear mischief in the (*a*) external ear, (*b*) middle ear, (*c*) internal ear; and (4) remarks. Under these heads Peyser classifies the various more important occupations into: transport services;

industry—(*a*) metal, (*b*) chemical, (*c*) stone, (*d*) wood, (*e*) textiles; agriculture and mining; building construction; foodstuff preparation.

He draws a pathetic picture of the effects of noise on the boiler maker and the ship's riveter.

The second section of the brochure by Dr. Mane, presumably a medical inspector of factories, describes technical methods by which noise, and noise especially created by machinery, can be minimized. Personal attention, such as wearing plugs in the external meatus and the like he regards as of practically no value. He would depend largely on isolation of machines by means of materials which have slight specific gravity and small sound transmitting property. Air and materials in which pockets of air are a feature form the best nonconducting materials: *e.g.*, cork, felt, sand, rubber, and peat.

[It is impossible to do more here than indicate the usefulness to industry of this memorandum.]—T. M. L.

Some Observations on Miner's Nystagmus and its Treatment. *W. J. W. Ferguson. Tr. Inst. Min. Eng., May, 1929, vol. 77, p. 117.*

The author supports the view that this disease is caused by inadequate illumination. It is suggested that the insufficiency of light in the pit compels the miner to use his peripheral vision, and that the oscillations of the eyeballs represent an effort to stimulate as many of the perimacular cells as possible, and thus improve the vision. It has been suggested that the oscillation represents fatigue of the extra-ocular muscles, or, alternatively, an incoordination of the nerve centers controlling them. This author is of the view that the regularity and symmetrical character of the movements suggest the very reverse of incoordination. The dazzling sensation complained of by the men when they meet lights in the pit is claimed as further evidence of the "light" theory. It is noted that many miners who have not oscillation of the eyeballs have great difficulty in seeing in a dull light. On changing from daylight to the dim light underground, or from the pit to daylight, some time elapses before they become accustomed to the new conditions. A number of these men develop the oscillations after working in the pit for a longer period, as if this hypersensitiveness of the macula to light, coupled with its absence of function in a dull light, were a first and prolonged stage before the actual oscillation is provoked.

Discussing the question of treatment, the author thinks it is most harmful to the average case to be put on compensation and have nothing to do. If light work were found for such patients at first, many of them would not develop the neurotic symptoms. Five men, all marked cases of nystagmus of considerable duration, who remained at work at the coal face, were treated by the administration of calcium, iron, and vitamin D. After seven months all had regained normal acuity of vision. Headache and giddiness had been absent since early in the course of treatment, and the oscillations were in all cases less marked. —T. B.

Some Observations on Miner's Nystagmus and its Treatment. *Discussion on paper by W. J. W. Fergu-*

son. Tr. Inst. Min. Eng., Nov., 1929, vol. 78, p. 86.

The author reports, six months later, on a reexamination of the five patients referred to in his paper. Two now show no oscillations of the eyeballs, and the remaining three show no further change in condition.—T. B.

A Study of the Anterior Segment of the Eye in Workers Employed in the Tobacco Industry. *Z. M. Iofe. Abstr. as follows from Russk. Oft. Jour., 1930, vol. 11, part 3, pp. 305–313, in Am. Jour. Ophth., Aug., 1930, vol. 13, pp. 747–748.*

An examination of the eyes of 100 workers employed in a tobacco factory did not reveal any appreciable pupillary disturbances of the type reported previously by Hirschler, Raymond, Frank-Hochhart, and others. The corneal sensibility, tested by the use of Samoilov's method, was found definitely lowered in the eyes of these workers. No conjunctival changes which could be attributed to tobacco dust were detected.

INDUSTRIAL SURGERY

A Splint for Fractures of the Phalanges. *J. R. Knowles. Jour. Am. Med. Assn., June 28, 1930, vol. 94, p. 2065.*

Knowles describes, with illustrations, a splint—which he thinks particularly useful in industrial work—for fractures of the phalanges with bowing or displacement.—K. R. D.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

An Apparatus for Artificial Breathing under Physiologic Conditions. *H. Winterstein. Abstr. as follows from Arch. f. d. ges. Physiol., 1929, vol. 222, pp. 409–410, in Ber. ü. d. ges. Physiol. u. exper. Pharmakol., Nov. 20, 1929, vol. 51, p. 738.*

The animal (rabbit) is placed in a rectangular metal box with its head projecting through an inflated rubber ring to make the opening air tight. The pressure variations in the box are recorded. They are produced by an electric suction pump in which the compressed air and suction streams are separate. Inhalation is caused by suction of the air out of the box; the frequency and the gauge (stroke, T-tube with set screw) can easily be varied. When the suction effect ceases, a purely passive exhalation follows.

Rise in Urinary Acidity during Work and its Relation to Fatigue. *M. S. Reznitschenko. Abstr. as follows from Zhurnal exper. Biol. Med., 1929, vol. 11, pp. 86–94, in Chem. Abstr., March 20, 1930, vol. 24, p. 1414.*

The curve of urinary hydrogen ion concentration during work reflects the intensity of the physical exertion. The absolute change in the hydrogen ion concentration values may serve as an index of the degree of fatigue of the working organism.—P. D.

Functional Reactions Resulting from Occupational Effort and their Pathologic Significance. *J. Guelmann. Méd. du travail, March, 1930, pp. 165–182.*

An interesting study is presented of variations in the blood pressure and in

the rates of respiration and pulse during work calling for hard physical endeavor and exposure to high temperatures. Weavers, rubber workers, clay kneaders, hammermen, smelters, and agricultural laborers were observed. The article is illustrated by good curves. Hard work raised the blood pressure to 175 to 200 mm. mercury, quickened the pulse to 145 to 200 beats a minute and the breathing to 36 to 50 respirations, varying with the vigor needed; but toward the end of the day the quickened pulse was associated with a relative lowering of the blood pressure. Such effort repeated day by day is held in the long run to determine pathologic changes in the circulatory system. High temperatures caused a rapid increase in pulse rate and in respiration, but a lowering of blood pressure by 20 to 30 mm.; if combined with hard work, the conditions were bad for the heart. The study is claimed to exhibit how functional insufficiency and incoordination, or even organic disease, may originate.

The aqueous balance was also studied; here hard and hot work caused a loss of from 2 to 10 pounds daily. In order to carry out heat regulation, reserve moisture may be drawn from the tissues which may only be finally made up at the week-end rest. With the loss of water goes increased loss of salt and decrease in the urine excreted. Such abnormal effort must lead in time to organic trouble. In addition, the effect of work on the gastric function was noted, when the free acid was found to fall with a sharp increase in mucous secretion; at the same time the stomach contents were precipitately evacuated. Hence may commence gastritis, gastric ulcers, and enterocolitis.—E. L. C.

THE COMPOSITION OF ALVEOLAR AIR IN INDIVIDUALS PLACED UNDER BAROMETRIC DEPRESSION IN AIR AND IN VARIOUS MIXTURES OF GASES AND THE MAXIMUM RESISTANCE OF MAN TO DEPRESSION. *C. Talenti. Abstr. as follows from Arch. di sc. biol., 1929, vol. 14, pp. 125–156, in Chem. Abstr., June 20, 1930, vol. 24, p. 3045.*

The composition of the alveolar gases in two subjects who respired air at a pressure of 360 mm. of mercury was determined. Studies were made on the maximum resistance to barometric depression, and on the composition of the alveolar air while they breathed pure oxygen and carbon dioxide. In breathing 97 per cent. oxygen, the curve for the pressure of alveolar oxygen as a function of the total pressure approaches a straight line, being a little different from that when air is respired. In the curve for the pressure of carbon dioxide as a function of the total pressure, the value of pressure of the alveolar carbon dioxide is proportional to the log of the pressure whether oxygen or air is respired; only the value of the constant is different. Below 69 mm. of mercury of alveolar oxygen the pressure of carbon dioxide in the alveoli is greater in an atmosphere of oxygen, but above that figure the pressure of alveolar carbon dioxide is greater in air; this shows that the pressure of the carbon dioxide in the alveoli does not depend exclusively on the pressure of oxygen; otherwise the two curves would overlap. The alveolar pressure of oxygen is within the limits of the experimental error greater always in air than in pure oxygen, showing that in addition to the partial pressure of oxygen some other factor influences the behavior of the alveoli gases. When Mosso's mix-

tures containing 7 to 10 per cent. carbon dioxide were respired, there was a noticeable improvement in the general state of the subjects which enabled them to withstand a total pressure of 107 to 110 mm. of mercury, and that, in spite of the diminution of the pressure of the alveolar oxygen with respect to that found at fictitious altitudes and in pure oxygen.—P. D.

WOMEN AND CHILDREN IN INDUSTRY

WOMEN'S WORK. *A. Thiele, E. Krüger, H. Sellheim. M. Juchacz, G. Leifer, and H. Küstner. Abstr. from Beihefte z. Zentralbl. f. Gewerbehyg., 1929, no. 13, pp. 76, in Bull. Hyg., Oct., 1929, vol. 4, pp. 878–879.*

The main object of this brochure is to give an insight into the lightening of women's work by the widespread rationalization of industry which has taken place during the last ten years. And this is well achieved by the fifty-eight illustrations commencing in the reception bureau of a large engineering works such as Siemens and Halske, or the Osram incandescent electric light bulb works, the former showing the tests to which the applicants for work are subjected, the standard required in each of the different processes, and the vocational school through which all must pass so as to try and insure that square pegs do not fill round holes. An interesting chart is given of the relative skill attained by one and another beginner in the course of thirteen weeks' training. We are then shown the right and wrong way of carrying out certain operations, the advantages of good seating accommodation in relieving strain, similarly the advantages (which are stressed in the case of women) of piecework (*Fliessarbeit*) through the medium of traveling belts, etc., and illustrated by the ten processes into which the final attachment of the filament and packing of electric light bulbs are subdivided, etc., the prevention of accidents in the metal industry by self-acting guards, locally applied exhaust ventilation for the removal of fumes, automatic sandblasting, equipment of an ambulance room, orderliness of workrooms (showing flower pots along the window sill), washing and cloakroom accommodation and rest room.

The comprehensive scope of the work is due to the fact that six experts (men and women) have worked together in its preparation. In addition to the article described there are others on "Women's Work and National Health"; "Factory Inspection in Relation to Women's Work"; "Women's Work and the Expectant Mother"; and "The Professional Woman."

The most scientifically worked out section is that on "Pregnancy in Relation to Women's Work" by the director of the Gynecological Department of the University of Leipzig, brought into relation, as it is, with Atzler's well-known studies. The great point made is that if the expectant mother ceases factory work six weeks before her confinement not only is this likely to be more natural than that of her sister who continues to work up to the end of term, but the infant also will be on the average at birth a pound the heavier of the two.—T. M. L.

AN EXPERIMENT TO DECIDE THE MAXIMUM BURDENS FOR WEIGHT LIFTING BY WOMEN IN INDUSTRY. *S. Kaploune. Paper read at the Fourth Session of the Permanent International Committee on Occupational Diseases, Lyons, 1929. Méd. du travail, May, 1930, pp. 205–214.*

A statistical inquiry revealed that women, while lifting weights in such industries as engineering and mining, experienced menstrual troubles more than at other times, and more than women, such as seamstresses, who do not lift weights; similarly metrorrhagia and prolapse were more frequent. These results are ascribed purely to the mechanical influence of weight lifting, which, by raising the intra-abdominal pressure, may even cause premature delivery. A rectal bag indicated that the rise in pressure was proportionate to the weight lifted; but a sudden rise occurred when the weight exceeded 20 to 25 kg. while below this threshold the rises in pressure were not important. The pressure was found to exert a particularly unfavorable influence if the uterus was retroverted or otherwise out of normal position. When two women together moved weights in a barrow, a threshold was found at from 50 to 60 kg. Above this limit, the energy expended, when measured by the oxygen intake, rose suddenly from a standard of 30 calories in one woman at 30 to 50 kg. to 40 calories at 60 kg., and from about 35 calories in another at 30 to 50 kg., to 45 calories at 60 kg. The thresholds so ascertained are put forward as limits which should not be exceeded in industrial work.—E. L. C.

INVESTIGATIONS ON THE INFLUENCE OF FACTORY LABOR ON PREGNANCY, BIRTH, AND CHILD REARING. *Teleky. Méd du travail, July, 1930, pp. 291–293.*

INDUSTRIAL ENVIRONMENTAL CONDITIONS

THE KATA THERMOMETER. RESULTS OF TWELVE MONTHS' EXPERIENCE BY THE FACTORIES AND STEAM BOILERS DEPARTMENT. *A. E. Wilson. Rep. Commonwealth and States of Australia, Fourth Conference Indust. Hyg., Canberra, March 13, 1930.*

Studies of air conditions in factories show that the standards of desirable kata cooling powers recommended by Hill for England are too high for Adelaide, Australia. The variation is attributed to differences in adaptation, clothing, and humidity of air in the two countries.

In paint spraying booths, where the chief object is to keep the operator's head clear of paint mist, the author points out that a fixed ratio of air movement is not necessarily satisfactory. The air pressure at the paint gun and possibly the size of the nozzles must also be considered in fixing the amount of air movement necessary for good results. The type of booth recommended is one fitted with a turntable to carry the work while the operator stands with his back to the air current and to the light.—C. P. Y.

THE REMOVAL OF STEAM AND VAPORS FROM FACTORY ATMOSPHERES. *H. Winter. Abstr. as follows from Indust. Chemist, 1929, vol. 5, pp. 457–*

461, in Chem. Abstr., March 10, 1930, vol. 24, p. 1165.

The difficulties to be overcome, especially in the dyehouse, are discussed, and the shortcomings of some common methods enumerated. A very successful method is given in detail, with drawings and photographs, in which air is admitted through ventilators placed in the roof of the central corridor of the dyehouse. The air is drawn over the dye vats and out through chimney-like flues built at intervals in the roof along the lateral walls.—P. D.

THE SALTS LOST BY SWEATING OWING TO HIGH AIR-TEMPERATURES. SIXTEENTH REPORT TO THE COMMITTEE ON THE CONTROL OF ATMOSPHERIC CONDITIONS IN HOT AND DEEP MINES. *W. Hancock, A. G. R. Whitehouse, and J. S. Haldane. Tr. Inst. Min. Eng., Aug., 1929, vol. 77, p. 322.*

The research described in this paper is a continuation of the work of K. N. Moss (*Tr. Inst. Min. Eng.*, 1923–1924, vol. 66, p. 284, and 1924–1925, vol. 68, p. 377), and is concerned with the nature and percentage of the chloride lost by the skin under various conditions. It is concluded that loss of water from the skin is due partly to water passing by osmosis through the skin apart from sweating, and partly to sweating. True sweating is commonly in abeyance in temperate or cold climates. When the rate of water loss is small, the loss is due entirely to the former cause; as the water loss becomes greater, an increasing proportion of the loss is due to sweating. The percentage of chloride in true sweat increases markedly with the duration of sweating, and also, to a much less extent, with abundance in the supply of either sodium or potassium chloride to the body, or as a consequence of reducing the supply of water. The increase in chloride percentage is ascribed mainly to fatigue of the glands. The percentage of chloride in pure sweat is reduced only slightly if abundance of water is drunk or if the supply of chloride to the body is reduced.—T. B.

WORK OF THE COMMITTEE OF THE INSTITUTION OF MINING ENGINEERS ON "THE CONTROL OF ATMOSPHERIC CONDITIONS IN HOT AND DEEP MINES." *J. S. Haldane. Tr. Inst. Min. Eng., Aug., 1929, vol. 77, p. 338.*

This paper gives a valuable summary of the main points in the sixteen reports published by the Committee from its inception in 1918 to the present time. In concluding his review, the author emphasizes the opinion that by properly applied ventilation methods, all the physiologic difficulties arising from heat in mines, up to much greater depths than have hitherto been reached, can be overcome without any excessive extra expenditure.—T. B.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

PREVENTIVE MEDICAL EXAMINATIONS IN INDUSTRY. *R. Sand. Lancet, Aug. 23, 1930, vol. 2, pp. 432–433.*

The author is counselor to the Red Cross societies. Medical examinations, introduced for the army and

navy, have been adopted by industrial and business concerns as an economic asset. Through them, teamwork has developed and is extending. In the United States insurance companies gain two dollars for every dollar expended on this service. There should be periodic annual examinations as well as an initial examination. They enable an employer to accept many handicapped persons for special work who would otherwise not be engaged. They have revealed the existence of a vast amount of removable health troubles affecting eyes, nose, throat, teeth, digestion, and the like.

Medical practice has yet to adjust itself to the progress of teamwork. The day of the isolated practitioner must pass. Organized practice must be adopted; it is more effective, more dignified, and less expensive to provide. Scientific prevention will supplant empiric treatment. The medical profession and its service has to undergo an inevitable transformation; and the way is being taught by industrial practice.—E. L. C.

Activities of Commonwealth Medical Officers. *F. R. Kerr. Health, Commonwealth of Australia, June, 1930, pp. 55–60.*

The Division of Industrial Hygiene, when appointed, investigated time lost for sickness by public service officers, and found 10.6 days per annum lost per clerical worker, as compared with 9 days per industrial worker in America. Temporary officers averaged only 6 days. The loss was attributed to lax medical supervision and unhygienic conditions. Once started, medical work grew rapidly and trained nurses were found necessary. Clinical examinations increased in Sydney from 3,210 in 1926 to 1927 to 4,936 in 1928 to 1929, and in Melbourne from 3,468 to 8,495. A reduction in sick leave has been effected; and the success of the service is leading to its wide adoption.—E. L. C.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

Health and Safety Survey of 25 Leading Department Stores in New York. *W. Jacobsohn. Am. Jour. Pub. Health, March, 1930, vol. 20, pp. 277–286.*

In the report of his survey, this writer emphasizes the wide variety of occupations and of hazardous environmental situations to be found under the administrative and executive control of department store management.

The body of the report consists of a series of tabulations which set forth the types of occupation, classified under the general functions of buying, transportation, receiving, stock control, manufacturing, repairing and alterations, publicity, selling, delivery, financial records, and "service" to personnel and customers. One table presents special corrective recommendations arranged to indicate the frequency of each recommendation in each of the stores included in the survey.

The text of the report is mainly confined to brief comments on the contents of the tables and on the hazards associated with the various types of occupation.—H. W. S.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

PROGRESS IN PSYCHIATRY. I. INDUSTRIAL PSYCHIATRY. *F. Wertham. Arch. Neurol. and Psychiat., June, 1930, vol. 23, pp. 1248–1257.*

The appearance of Anderson's book, "Psychiatry in Industry," prompted Wertham to undertake a review of the developments in industrial psychiatry. He deals in some detail with the pioneer attempts of Ball, in 1916, to introduce psychiatric methods into the handling of personnel problems of industrial plants; then mentions briefly the contributions of Southard, Jarrett, Scott, and others; and finally discusses at considerable length the work of Anderson as set forth in his book.[1]—M. C. S.

THE PSYCHOLOGICAL AND PHYSIOLOGICAL FITNESS OF DRIVERS OF AUTOMOBILES. *L. Weekers. Abstr. as follows from Arch. d'Opht., Dec., 1929, vol. 46, p. 717, in Am. Jour. Ophth., June, 1930, vol. 13, p. 566.*

The question of the visual requirements of automobile drivers was taken up by the Thirteenth International Congress of Ophthalmology. The factors to be considered in an automobile driver are physical, psychologic, and legal. Psychologic factors are of the greatest importance, as emotionalism, fatigue, or anxiety may cause even a physically perfect driver to become dangerous. When a physically unfit driver meets with an accident one cannot say whether the physical unfitness was the cause of it or not. But from a study of statistics it has been definitely shown that the percentage of accidents is diminished when physically and psychologically unfit workers are eliminated from companies which have to do with public transportation. Therefore it should be possible to diminish the number of accidents among automobile drivers in general if by some sort of selection the unfit were prevented from driving.

Requirements for various purposes are discussed in great detail.

VISUAL STANDARDS FOR NAVIGATING OFFICERS. *B. James. Abstr. as follows from Med. Jour. Australia, Nov. 16, 1929, vol. 2, p. 724, in Am. Jour. Ophth., April, 1930, vol. 13, p. 374.*

In the ophthalmologic section of the Victorian branch of the British Medical Association, Barrett proposed that a deputation from this section should wait upon the premier urging the necessity for some form of supervision of the visual acuity of members of the mercantile marine; and suggesting that a periodic ocular examination should be made of all navigating officers in that service, and that when a marine accident occurred it should be a rule always to have the eyes of the officers concerned examined and reported upon by a competent oculist.

The speaker remarked that when an accident occurred at sea an explanation was sought for diligently, but there was no visual test of the responsible persons concerned. He instanced an officer in the mercantile marine, with grossly defective color vision, who for years had been in a responsible position. The standards of entrance

[1] For review of this book, see THIS JOUR., 1930, vol. 12, pp. 121–122.

for the Port Phillip pilot service (Melbourne) had resulted, he said, in a very high level of visual efficiency.

COLOUR VISION TESTS. *O. Oblath. Internat. Labour Office. Studies and Rep., Series F (Indust. Hyg.) No. 12, 1929, pp. 48.*

This study of color vision tests is a valuable one. First, some description is given of color appreciation, and of the various degrees of congenital color blindness which may be present, and also of defective color sense. Its importance in certain occupations is described, particularly for railway men and sailors, for airmen and chauffeurs. Instances are given where great disasters have followed incapacity to distinguish danger signals. For the most part, red and green are used for this purpose; unfortunately the commonest form of color blindness is for these two colors.

Methods for testing color perception are described, and several excellent colored diagrams are given. Holmgren's wools remain the test most usually employed, but many others rather more sensitive have been introduced, all of which are referred to; and the care is mentioned which must be taken in using them correctly. This description of the various tests is perhaps the most complete in the literature of the subject. The conclusion is expressed that no single test is entirely satisfactory, and that any doubtful cases should be tested by two or more methods.

An account is then given of the methods of examination for color sense which are today in use in different countries for various occupations. The opinion is expressed that there should be some international standard, and that every country should establish for the occupations concerned a standard examination of color sense which is strictly defined. The method should be simple and rapid, and complicated apparatus should be avoided. Defects of color vision are dangerous alike to the individual and to the community.—E. L. C.

SAFEGUARDING THE WORKERS AND RATIONALIZATION. *Waffen-Schmidt, H. Gerbis, and H. Eibel. Abstr. as follows from Beihefte z. Zentralbl. f. Gewerbehyg., 1929, no. 14, pp. 59, in Bull. Hyg., March, 1930, vol. 5, pp. 261–262.*

This brochure of the German Association for Factory Hygiene presents another aspect of the mechanization of industry to that given in the thirteenth on "Women's Work" (see p. 204). What was inculcated, however, in the latter as to the economy in labor resulting from the development of sectional work by means of traveling belts, mechanical means of transport, and the like (*Fliessarbeit*) is repeated here, with a wealth of illustrations of automatic machinery and aids to expedition. This aspect is particularly the province of the engineer, and an illustration of a complicated machine by which all electric lamp bulbs are now blown is given. The well-known Ford methods of continuous sectional building up of automobiles traveling along rails are illustrated. A peculiarly ingenious machine is described, to one end of which dirty bottles are brought and in their traverse to the other end are cleaned by revolving brushes and water jets, filled with the liquid required, closed,

sealed, stamped, and automatically dispatched along traveling belts to the discharge platforms. A single man only is in attendance.

Allied branches of the subject dealt with are economy in transport and standardization, *e.g.*, of sacks so that they can be conveniently handled, and of machine parts. A diagram is given showing that, when nine firms wanted in all 3,600 bolt heads (*Kolben*) and each used a different pattern, the price was 14 marks apiece; when, by standardization, they were content with three patterns, the price fell to 10 marks, and when content with one to 7 marks.

The engineers are satisfied that, in the main, rationalization is favorable to a reduction in the accident rate, but, surprisingly, they say no statistical data are available to prove it. Gerbis enlarges on all the opportunities, in the matter of welfare, a rightly designed system of rationalizaton offers, as opposed to what is here called "Amerikanismus." Little that is fresh, however, is said on such subjects as ventilation, lighting, seating accommodation, the advantages of pauses, etc. He does not anticipate that the workman really will take less interest in his task under the best conditions of rationalization.—T. M. L.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Trachoma and Industrial Accidents. *V. Morax. Abstr. as follows from Rev. internat. du trachôme, April, 1929, vol. 5, pp. 95–100, in Am. Jour. Ophth., April, 1930, vol. 13, p. 375.*

Morax reports a case of trachoma induced by a burn of the lids and conjunctiva of the right eye, with transmission of the infection to the other eye. Corneal involvement caused marked reduction of vision, so that the patient was awarded a 70 per cent. disability for one year.

On the Indemnity Due to a Monocular Workman on Loss of Second Eye. *L. Maggiore. Abstr. as follows from Ann. di ottal., June–July, 1929, vol. 57, p. 557, in Am. Jour. Ophth., April, 1930, vol. 13, p. 375.*

This important medicolegal question on being submitted by the Sassari court to Maggiore for an opinion is answered in elaborate detail. Loss of a single eye, according to the Italian law, does not entitle the claimant to an indemnity of 50 per cent. of total loss. He, it is true, is not the equal of a normal man. His visual field has been limited, he no longer has stereoscopic vision and has no depth perception. But in many lines of activity he can still work as effectively as a man with both eyes. In the case cited, the wages had not been reduced because of the primary loss, and the contract which had secured him insurance against loss from injury had been made with the understanding that he had but one eye. In the Italian courts, with the assumption of 100 per cent. as normal for one with both eyes effective, the loss of one eye carries an indemnity of 35 per cent. But when the second eye is lost would this be adequate compensation? Obviously not, for the man is now wholly disabled. Considering deprivation of the

first eye as a loss of 35 per cent., the remaining eye had a value of 65 per cent. at the time of injury. This amount was allowed, and Maggiore's argument, repeated by the judge, was incorporated into the law.

TRAUMATIC DETACHMENT OF THE RETINA UNDER THE WORKMEN'S ACCIDENT INSURANCE ASSOCIATION (CZECHOSLOVAKIA). *A. Zahor. Abstr. as follows from Bratisl. lekár. listy, Oct., 1929, vol. 9, p. 1133, in Am. Jour. Ophth., June, 1930, vol. 13, p. 560.*

Among 6,476 ocular injuries examined for the insurance association there were 69 cases of retinal detachment. After disputing liability in some cases, the association finally accepted it in 50 cases and was exempt in 19. Eleven cases were associated with perforating injuries, and in these, of course, the relation of the detachment to the injury was obvious. Of the other 58 cases, 38 were attributed by the patients to ocular contusions. In determining the influence of the injury on the disease, it is necessary to elicit a very careful history and to make every effort to obtain reliable information relative to the condition of the eye previous to the injury. Patients have a tendency to attribute retinal detachment to an injury, even when it is a result of ocular disease, such as myopia or intraocular inflammation. With a history of an ocular contusion, a retinal detachment in previously normal eyes was in every case considered a result of the injury. In eyes predisposed to detachment, the disease was attributed to the injury in 48 per cent. of the cases. Among detachments attributed to injuries other than ocular contusions, only 45 per cent. were really due to traumatism.

ACTIVITIES OF SILICOSIS JOINT COMMITTEE. COUNTY OF CUMBERLAND. *Third Ann. Rep. Workers' Compensation Commission of New South Wales, July 1, 1928 to June 30, 1929. Sydney, 1930, pp. 28–44.*

An account is given of the working of the first scheme made under the Workmen's Compensation (Silicosis) Act, 1920, as amended in 1926. It applies to stonemasons, quarrymen, rock choppers or sewer miners, and came into force on Sept. 16, 1927, but was amended on June 7, 1929. The medical authority awarded compensation to 37 cases out of 74 applications, 14 being stonemasons, 12 quarrymen, and 11 rock choppers and sewer miners. Up to date, 59 workmen have been compensated: 6 for death, 42 for total incapacity, and 11 for partial incapacity.

Seventy-five men were suspended for work at initial examinations, of whom 31 were rock choppers and 39 sewer miners. In all, 1,077 workmen were given medical examinations. The earliest condition which can be recognized radiographically is named class A and is equivalent to anteprimary of South Africa; then follow the early, marked, and advanced stages of silicosis, and also silicosis with tuberculosis. Out of 107 stonemasons examined, 52 were more or less affected; of 39 monumental masons, 8; of 37 ballast quarrymen, 3; of 80 dimension quarrymen, 37; of 377 rock choppers, 47; and of 79 sewer miners, 66. Each man in the industry must have an employment register

which sets out his occupational history. Information is given as to the financial aspects of the scheme which depends upon a fund composed of levies from employers and subsidies from the government.—E. L. C.

COAL MINES GENERAL REGULATIONS (FIRST AID), 1930, DATED FEBRUARY 11, 1930. *Statutory Rules and Orders, No. 91. H. M. Stationery Office, 1930.*

These general regulations for coal mines in Great Britain concern the provision of first aid and ambulance, and replace the regulations previously in force. The principal features of the new regulations are as follows:

1. A first aid room is required on the surface at all mines employing more than 100 persons in any one shift. At smaller mines, a suitable shelter will be accepted instead of this room. In each case a responsible person must be in charge and the prescribed equipment must be provided.

2. A specified proportion (normally one in thirty) of persons employed underground must be qualified first aid men.

3. Dressings and antiseptics for use underground are to be provided in portable form in either or both of the following ways: an outfit supplied to each person employed underground, or a box carried by each first aid man. Each outfit and box is to be brought to the surface at the end of each shift by the person in charge of it and is to be examined and, when necessary, replenished by the person in charge of the first aid room.

In addition to the above, stretchers, splints, etc., are to be kept underground at convenient places known as first aid stations.

4. Sinking pits and mines employing less than thirty persons underground are exempted from the requirements as to *underground* organization (but *not* from those as to surface organization) unless otherwise required by the inspector of the division.

5. An effective motor ambulance service must be provided at every mine. It is left to the owner's discretion to provide this either himself, or co-operatively with the owners of other mines, or by application to the ambulance services provided by the St. John, St. Andrew, the British Red Cross, or other associations.

6. In shafts where the cage is not large enough to permit of a stretcher being laid flat, and in sinking pits, a suitable appliance for raising injured persons with the minimum of discomfort must be provided.

The equipment for a first aid room is set out in the first schedule to the Statutory Regulations. A second schedule details the equipment to be provided at small mines where a first aid room is not provided; while a third schedule prescribes the contents of first aid boxes for use underground. The provision contemplates extensive use of sterilized dressings with iodine as an antiseptic, so bringing first aid practice in the mining industry in line with what has been adopted for factories.—E. L. C.

THE INTERNATIONAL LABOUR CONFERENCE AND THE INSURANCE OF OCCUPATIONAL DISEASES. *L. Carozzi. Arch. f. Gewerbepath. u. Gewerbehyg., 1930, vol. 1, no. 3, pp. 317–329.*

The problem of insurance against occupational diseases has been considered at several international congresses. In 1925 it was remarked that the list of diseases which are compensated was very restricted. There are now many experts who include under occupational diseases those which occur with an unusual frequency in an occupation, as well as those from which there is a definite occupational risk. There is need for further work to define what is meant by occupational disease. As an example some figures of Linenthal's are quoted relating to 10,360 outpatients treated at the Massachusetts General Hospital, which show that pastry cooks are particularly liable to gastric ulcer and gallstones.

For many years Carozzi has strongly held the view that the system of having a list of diseases which are compensated is too limited and that it allows many deserving cases to suffer without compensation. Cases continually occur in the law courts and the legal decisions, though strictly right, are unsatisfactory and there must be a change in the law. For example, "a repairer" or "a man who handles the goods" does not receive compensation as does the man who makes the goods (*e.g.*, accumulators). In many cases the courts take a very broad view of the expression "injury from power" or "during work" in order to compensate cases which are not covered by the diseases on the list. There should be compensation for occupational diseases just as for accidents.

In the United States in 1910, it has been estimated 284,750,000 working days were lost by sickness in a working population of 33,500,000; an average of eight and one-half days per worker. The Metropolitan Life Insurance Company has estimated that this caused a loss in wages of 550 to 750 million dollars.

There are many factors which play a part on the individual, as age, food, race, and constitution. There are invalids as well as diseases. There are a large number of diseases on the border line between ordinary diseases and occupational diseases. They are called, by some experts, diseases of labor. It would be best to include the diseases under the general insurance scheme of the country, but the difficulty is that such an advanced insurance scheme does not exist in all countries and time will be required to prepare the insurance system so as to deal with the cases. It would be better if in laws on compensation the word "injury" was used instead of "accident." Two states in the United States, California and Wisconsin, for several years have thus compensated occupational diseases, and it has been found that the number has not been too excessive.

But compensation should be associated with prophylaxis and measures taken for the medical supervision of the employed and of the workplaces, for the rejection of those unfitted for the work and finding suitable occupation for the rejected men, and for the protection of the worker against noxious fumes. It is often said sickness is preventable; why then should we not prevent it?—A. J. C.

REHABILITATION OF DISABLED EMPLOYEES

THE REHABILITATION OF THE DISABLED. *H. E. Mock. Jour. Am. Med. Assn., July 5, 1930, vol. 95, pp. 31–34.*

In emphasizing the importance of restoring disabled persons and parts to as nearly normal a condition as possible, Mock outlines the scope of rehabilitation of the disabled, which, in his opinion, properly includes prevention of accident and disease; treatment with a view to securing the greatest possible functional restoration; convalescent care of the disabled; placement at suitable employment; training for a new vocation when necessary; and medical follow-up to make sure that rehabilitation is complete and permanent.—K. R. D.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

THE HEALTH OF THE WORKER OF TO-DAY. *T. Oliver. Jour. State Med., Aug., 1930, vol. 38, pp. 454–463.*

Progress in England since the war has been checked. In particular, sickness claims have risen 41 per cent. for men, 60 per cent. for unmarried women, and 106 per cent. for married women. Within the last thirty years, length of sickness has increased from sixteen and one-half days to twenty-eight. Yet the standard of life has risen and mortality has fallen. Inquiries in trades have shown an undue prevalence of phthisis among printers, and of digestive troubles among weavers.

Machinery for coal cutting in mines drowns roof sounds and so increases risk from falls; it increases the dust hazard but by lessening the use of the pick, decreases beat hands, although beat knees remain unaffected; and nystagmus persists an unabated calamity. The dust hazard in gold mining, metal grinding, and the potteries is better understood and minimized.

Among boiler makers data are quoted to show an increase of deaths from heart disease and cancer, but a decrease from tuberculosis. The duty of a doctor is to prolong life; but the state requires productive citizens, and so adds another duty to the profession of industrial medicine.—E. L. C.

MERCHANT SEAMEN'S HEALTH AND WELFARE. *F. Humbert. World's Health, Jan.–March, 1930, vol. 11, pp. 47–58.*

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

ANNUAL REPORTS OF THE SECRETARY FOR MINES AND THE CHIEF INSPECTOR OF MINES FOR 1929. *H. M. Stationery Office, 1930.*

Information is given relative to the mining and quarrying of coal, metalliferous ores, and minerals. The coal trade showed improvement; prices and wages were better; and more mechanical appliances were in use. Of the total output of coal, 27.9 per cent. was cut by machine as compared with 13.2 per cent. in 1920, 6 per cent. in 1910, and 1.4 per cent. in 1900; in parts of Scotland the proportion was as high as 69 and 71 per cent. A slight increase occurred in the accident rate; but those due to explosions kept at a low figure as compared with thirty years ago. The mean accident death rate for the period 1923 to 1928 was 1.0 in Great Britain, as against 1.0 in France, 1.1 in Belgium, 1.3 in British India, 2.2 in Germany, 3.7 in United States anthracite mines, and 4.9 in United States bituminous mines. Reviewing a number of years, a steady decline has occurred in shaft accidents

and explosions, far more than for falls of ground. Out of 784,843 safety lamps in use, 48.9 per cent. were electric, a rise of 1.5 per cent. over 1928; new cases of miners' nystagmus numbered 2,577 as against 2,554 in 1928, 3,444 in 1925, and 4,092 in 1922. Meanwhile, cases of beat hand rose from 1,349 in 1928 to 1,707, of beat knee from 2,644 to 3,403, and of beat elbow from 392 to 458. Reference is made to the management of the miners' welfare fund and the erection of pithead baths which now accommodate 60,000 men and are rapidly becoming more numerous. The effects of inhaling dust upon men in hematite and coal mines and in slate quarries have been investigated, particularly with regard to silicosis. Statistical tables and usual charts occupy 130 pages out of the 200 comprising the volume.—E. L. C.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

RAYNAUD'S DISEASE (?). *H. G. Irvine. Arch. Dermat. and Syph., July, 1930, vol. 22, p. 151.*

A man, aged 30, whose occupation was dumping bags of flour, on Sept. 14, 1928, developed soreness at the finger tips where he grasped the bags, and in April, 1929, he was forced to stop work. He complained of pain in these fingers and stated that crusts formed on the ends and peeled off. The flesh was gradually drawing away from the ends of the nails.

The results of a general examination, including the Wassermann test, examination of the blood, and blood chemistry, were negative. Roentgen examination showed normal bones. His basal metabolic rate was −7. He had received no treatment.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

LESSONS LEARNT FROM INDUSTRIAL GASES AND FUMES. *T. Legge. Lecture to Institute of Chemistry of Great Britain and Ireland. London, Feb., 1930, pp. 23.*

A useful review is given of certain intoxications resulting from inhalation of industrial gases and fumes which came under the author's observation while Medical Inspector of Factories. He deals first with arseniuretted hydrogen generated in the manufacture of zinc chloride, as a result of contamination of the acid used with arsenic. Next nickel carbonyl is mentioned, concerning which the late Dr. Armit showed that the symptoms were due to deposition of nickel in a very fine state of subdivision over the immense area of the respiratory surface. In this case the origin of the poisoning and methods for its prevention were carefully worked out by the factory concerned.

Following this is a description of how lead poisoning arises in the tinning of hollow ware, from fumes of chloride of lead generated when metal

wet with zinc chloride is dipped into a molten mixture of tin and lead. In this case the method of poisoning and its prevention was worked out by the Factory Department. At the same time the investigation led to determining that 2 mg. of lead is the smallest daily dose which will in time set up chronic lead poisoning.

Another form of poisoning referred to is that arising from fumes of manganese iron ore. It was first detected in America, although cases had certainly occurred in Great Britain without their origin being discovered. The detection of tetrachlorethane as a poison, the fumes of which used to be inhaled when it was contained in dope used for varnishing airplane wings, is related, with its specific destructive action on the liver. The effect of benzene upon the blood cells is alluded to, when its vapor is inhaled during the application of paint in the form of spray or cellulose lacquer. Particular attention is directed to the steadily increasing number of reported cases of poisoning by carbon monoxide at factory premises, due to ignorance of the danger, the inodorous nature of the gas, men working alone, and lack of rescue appliances.

The lecture closes with a description of breathing apparatus to be used when entering asphyxiating atmospheres, and in particular of gas masks, such as have been elaborated in the United States Bureau of Mines at Pittsburgh. The lecture brings together in useful form much valuable information.—E. L. C.

ASEPTIC CHEMICAL NECROSIS FROM PRICKS WITH INDELIBLE PENCILS (METHYL VIOLET). *Fauconnet. Abstr. as follows from Mitt. a. d. Geb. d. Lebensm. u. Hyg., 1929, vol. 20, pp. 215–216, in Chem. Abstr., March 20, 1930, vol. 24, pp. 1429–1430.*

Punctures of the flesh with indelible pencils having methyl violet as a base may cause chemical necrosis of the tissue. The substitution of less poisonous dyes, such as methylene blue, is suggested.—P. D.

ACUTE RESPONSE OF GUINEA PIGS TO VAPORS OF SOME NEW COMMERCIAL ORGANIC COMPOUNDS. II. ETHYL BENZENE. *W. P. Yant, H. H. Schrenk, C. P. Waite, and F. A. Patty. U. S. Pub. Health Rep., May 20, 1930, vol. 45, pp. 1241–1250.*

The acute physiologic response of guinea-pigs to air containing ethyl benzene vapor was determined. The concentration of vapor and periods of exposure ranged from those which produced death to those which caused no apparent effect after several hours' exposure. The symptoms, gross pathology, and fatality are given, with a discussion of the potential health hazards.

1. In the order of occurrence, the symptoms observed were eye and nose irritation, and apparent vertigo, static and motor ataxia, apparent unconsciousness, tremor of extremities, rapid jerky respiration, then shallow respiration, and finally slow, gasping respiration, followed by death. Exposure to 1 per cent. caused all these symptoms and death in from two to three hours; 0.5 per cent. caused all the symptoms up to and including tremor of extremities, but not respiratory disturbances and death during or after exposure of eight hours; 0.2 per cent. caused all the symptoms up to and including

ataxia in eight hours; 0.1 per cent. did not cause symptoms other than eye irritation during eight hours.

2. The gross pathologic findings were congestion of the brain, and congestion and edema of the lungs. These were most severe for the exposures to 1 per cent. concentration of vapor until death ensued. A more moderate degree of the same type of pathology was found in the animals killed for autopsy immediately after exposure to 0.5 per cent. and to a less degree after exposure to 0.2 per cent. Gross pathology was not found in animals exposed to 0.1 per cent. for eight hours. The degree of pathologic changes increased in severity with increase in period of exposure to a given concentration of vapor. The pathology, however, decreased in severity during the four-day period of observation following exposure and was absent in most cases after eight days.

3. From the standpoint of acute poisoning, as produced by a single exposure, the relative toxicity of ethyl benzene appears to be slightly less than that of gasoline and benzene in the range of high concentrations, and practically the same as that of gasoline and benzene in moderate and low concentrations.

4. Ethyl benzene vapors are irritating to the eyes and upper respiratory passages in concentrations below those causing serious response. Also, other warning symptoms, such as vertigo, occur in advance of serious response from a single exposure.

5. The relatively low vapor pressure of ethyl benzene mitigates health hazards. Saturated air at 20°C. contains less than 2 per cent. vapor.

6. It was not possible at room temperatures to attain a concentration high enough to kill guinea-pigs in a short time. Exposure of from thirty to sixty minutes to 1 per cent. by volume produces marked symptoms and is dangerous to life following exposure; 0.7 per cent. is the maximum amount for sixty minutes' exposure without the occurrence of death, and 0.3 per cent. the maximum for sixty minutes without serious symptoms; 0.1 to 0.2 per cent. is the maximum concentration for a single exposure of several hours.—*Authors' Summary.*

ACUTE RESPONSE OF GUINEA PIGS TO VAPORS OF SOME NEW COMMERCIAL ORGANIC COMPOUNDS. III. "CELLOSOLVE" (MONO-ETHYL ETHER OF ETHYLENE GLYCOL). *C. P. Waite, F. A. Patty, and W. P. Yant. U. S. Pub. Health Rep., June 27, 1930, vol. 45, pp. 1459–1466 (Reprint No. 1389).*

The acute physiologic response of guinea-pigs to air containing cellosolve (monoethyl ether of ethylene glycol) vapor was determined. The concentration of vapor and periods of exposure ranged from those which produced death to those which caused no apparent effect after 24 hours' exposure. The symptoms, gross pathology, and fatality are given, together with a discussion of potential health hazards.

1. The symptoms exhibited after 18 to 24 hours' exposure to air saturated with cellosolve vapor (0.6 per cent. by volume) were inactivity, weakness, dyspnea, and death. Exposure to 0.6 per cent. for 24 hours caused death at the end of the exposure; 0.3 per cent. for 24 hours caused death in 24 hours following exposure; and expo-

sure to 0.6 per cent. for 10 hours, 0.3 and 0.1 for 18 hours, caused occasional death in from 1 to 8 days following exposure. Exposure to 0.6 per cent. for 1 hour, 0.3 for 4 hours, and 0.05 for 14 hours caused no apparent harm.

2. The principal gross pathologic findings were congestion and edema of the lungs; distention of the stomach, with numerous reddish-brown petechiæ scattered over the mucous membrane; and congestion of the kidney. The contents of the stomach were also discolored reddish brown. All these occurred in the animals that died during or soon after exposure. The congestion and edema were the principal findings in the animals that died 24 hours following exposure, and bronchopneumonia in the animals that died 3 days following.

3. Due to comparatively low vapor pressure of cellosolve it is not possible to create atmospheres at ordinary room temperatures which will produce serious acute poisoning in an hour.

4. Air saturated with cellosolve vapor at room temperatures produces a disagreeable odor and produces moderate eye irritation. If these properties are heeded as warning of the occurrence of a potentially dangerous atmosphere it is believed that acute poisoning will not occur.—*Authors' Summary.*

LEAD POISONING FROM APPLYING A LEAD ENAMEL TO METAL. *E. Agasse-Lafont. Méd. du travail, July, 1930, pp. 277–279.*

An inquiry was made at three factories employing 100 men. Red hot metal was either plunged into enamel powder or powdered with the enamel, and returned to the furnace where the enamel melted and spread out over the metal. The enamel contained up to 66 per cent. of red lead. Dust from the enamel got into the air and settled each hour on a square meter of the enameling table at the rate of 6.6 gm. of powder.

Among the men most exposed to risk, 60 per cent. experienced lead colic; 80 per cent. showed a line on their gums; and basophilic red cells were found in 90 per cent. These basophilic cells appeared after only a few days' exposure to risk and were closely associated with the presence of colic. They are a valuable indication of early or latent plumbism, and may disclose the existence of a personal idiosyncrasy to lead. The extent of the risk may be gathered from the fact that 132 workers were being engaged yearly to maintain a personnel of thirty-six.—E. L. C.

OCCUPATIONAL DISEASES OF LEAD SOLDERERS. *W. Weisbach. Méd. du travail, July, 1930, pp. 270–276.*

There are no grounds for presuming that all lead solderers are liable to contract lead poisoning, although they may do so. The author found only four certain cases; the affected men worked in confined spaces with little ventilation.—E. L. C.

BIOCHEMICAL CHANGES IN THE BLOOD IN CHRONIC LEAD POISONING. *M. J. Omeljanovitsch-Pavlenko. Abstr. as follows from Ztschr. f. Hyg., 1929, vol. 110, pp. 348–354, in Ber. ü. d. ges. Physiol. u. exper. Pharmakol., March 12, 1930, vol. 53, p. 373.*

The urine analysis of victims of lead poisoning shows an increased amount of bilirubin of hemolytic origin; hemol-

ysis and the bilirubin content increase during colic attacks. Moreover, the increased amount of hematoporphyrin corresponds to the hemolysis. The kidney function is affected by the lead, as is seen in the storing up of indican, and in the strengthening of the xantho-protein reaction. The increase in the cholesterin content of the blood is considered as a protective functioning of the organism in the case of young persons who have worked with lead for only a short time. During a colic attack, the alkali reserve of the blood diminishes, while the nitrogen and the bilirubin content increase.

INTERNAL SECRETION GLANDS DURING POISONING BY LEAD AND CARBON MONOXIDE. *I. M. Eissahovitch. Méd. du travail, March, 1930, pp. 139–146.*

The condition of the endocrine glands was studied in experiments on dogs and cats poisoned with white lead given in food over a period of twenty-five to 144 days. Atrophy of the thyroid occurred, with lessened activity of the chromatin system, increase in the fatty substances of the suprarenal capsules, and exhaustion of spermatogenesis. Certain morphologic changes were also noted which indicated that the equilibrium of internal secretions was disturbed by lead poisoning. Rabbits, dogs, cats, and white rats were exposed to carbon monoxide given either in concentrations of 2 to 0.4 per cent. over a period of eight hours and forty minutes, or in a concentration of 0.2 per cent. over a period of one to two hours, or by two or three successive nonfatal doses. Acute poisoning caused disappearance in the chromatin substances of the medullary layer of the suprarenal capsules, and of the colloidal material of the thyroid gland. More prolonged exposure disturbed the glandular reserves and increased their activity; the colloidal masses of the thyroid were formed.—E. L. C.

THE POSSIBILITY OF THE FORMATION OF LEAD-PHOSPHATIDE COMPOUNDS IN THE BODY. *G. Orestano. Abstr. as follows from Boll. Soc. ital. biol. sper., 1929, vol. 4, pp. 622–625, in Ber. ü. d. ges. Physiol. u. exper. Pharmakol., March 26, 1930, vol. 53, p. 624.*

According to Blair Bell the proliferation tendency of cancer cells is dependent upon their phosphatide content. If lead has a pronounced affinity for phosphatides, the fixation of lead in the cancer cells is a possibility. Injected soluble lead salts are converted into colloidal or granular (so-called) lead carbonato-phosphate. These particles again become soluble and could form a secondary combination with the phosphatides. Orestano has undertaken to trace this process in the body. Following chronic lead poisoning in dogs by means of intravenous injection of lead nitrate in isotonic sodium nitrate solution, the lead content of the liver and the brain was determined. While noteworthy amounts of lead were found in the liver after fifteen days, only traces could be found in the brain. Furthermore, only traces of lead could be found in the lipoids either of the brain or of the liver. Also the formation of insoluble lead-phosphatide compounds in alcohol or chloroform could not be substantiated. The phosphatide content of the cancer cells is therefore not responsible for the fixation of lead in

the cells. The fixation in newly formed cancer tissue must be associated rather with elements of the reticulo-endothelial system.—L. T. F.

EXPERIMENTAL MANGANESE POISONING. *A. M. Grünstein and N. Popowa. Abstr. as follows from Arch f. Psychiat., July, 1929, vol. 87, p. 742, in Arch. Neurol. and Psychiat., June, 1930, vol. 23, p. 1275.*

The authors report the results of clinical and anatomic observations of rabbits subjected to the effects of powdered manganese. They begin with a discussion of the literature, which they sum up as follows: In the reported cases of manganese poisoning in man, the clinical picture consisted of muscular rigidity, mask-like facies, compulsive laughing and crying, increased salivation, tremors, and disturbances of gait. These symptoms altogether usually presented a parkinson-like picture, so that it could be assumed that the pathologic process would be mainly localized in the globus pallidus. So far, however, no anatomic observations in such cases have been reported. Experimentally, observations of this type have been studied in animals of different types (Mella in this country studied the effects of manganese poisoning in monkeys).

The observations of the authors are essentially similar to those of other observers, and the results are summed up as follows: Clinically, the symptoms varied from episodic paralyses of the hind legs to general weakness of the musculature without any definite neurologic changes. Anatomically, marked changes of the central nervous system were found in the form of advanced degenerative phenomena of the nerve cells. These were particularly intense in the small cells of the caudate nucleus and putamen, but were observed also in the pallidum and in some parts of the cortex. In some cases there were, in addition to these changes, proliferations of the neuroglia and lesions in the walls of blood vessels, as well as degeneration in the cells of the choroid plexus. There were marked degenerative lesions in the liver, spleen, heart, kidneys, and suprarenal glands.

ANIMAL EXPERIMENTS ON THE ABSORPTION OF MERCURY FROM AIR CONTAINING MERCURY. *A. Stock and W. Zimmermann. Abstr. as follows from Biochem. Ztschr., 1929, vol. 216, pp. 243–248, in Chem. Abstr., April 10, 1930, vol. 24, p. 1658.*

Animals were kept in chambers through which air loaded with mercury at 50° was passed. The animals were killed with hydrocyanic acid and ground up in a meat chopper. The pulp was then treated with chlorine, the chlorine was driven off with carbon dioxide, and the mass centrifuged. The liquid which should be about 1.5 normal hydrochloric acid is treated with enough copper sulphate to give 10 mg. of copper and then hydrogen sulphide is led through the solution which is at first cold and later heated to boiling. The cupric sulphide and mercuric sulphide precipitate is centrifuged off, redissolved in a small volume (10 to 20 c.c.) with chlorine, the chlorine is again driven away with carbon dioxide and the solution once more treated with hydrogen sulphide. After warming and centrifuging, the residue is dissolved with chlorine and

the excess is driven off with carbon dioxide. Any precipitated sulphur is filtered off. To the clear filtrate in a 25-c.c. volumetric flask is added 2 to 3 gm. of finely powdered ammonium oxalate; this is warmed to 35° until the resulting solution is clear. The mercury is precipitated on a copper wire (heated and reduced with methyl alcohol) and determined colorimetrically with diphenylcarbazone. The experimental results are very variable. In one instance 53γ of mercury were retained in the first few days; this on the basis of a man's weight would amount to 6 mg. of mercury. Since about 40 mg. of mercury would have passed the man's lung during that time, by far the largest amount of mercury breathed in leaves the body in the expired air. The absorbed mercury leaves the body only very slowly, so that even after five weeks a fourth of the absorbed mercury is still found.—P. D.

Carcinogenicity of Oils. *Internat. Labour Office, Indust. and Labour Information, May 26, 1930, vol. 34, p. 279.*

The Manchester Committee on Cancer, a British organization, in its report for the year ended Oct. 31, 1929, makes the encouraging announcement that two of the largest oil producing companies in the world have recognized the importance of discovering a safe lubricating oil at reasonable cost and are assisting the Committee's staff in its investigations.

Tars at varying temperatures have been prepared to determine at what temperature carcinogenic compounds are formed, from which experiments it would appear that such compounds begin to be formed between 500° and 600°, the maximum yield lying between 800° and 900°. In course of previous investigations the research workers had succeeded in preparing a pure synthetic tar containing the carcinogenic principle in such concentration that a 5 per cent. solution was more effective in producing cancerous growths than shale oil, the most dangerous commercial oil, but it has now been found possible to produce tars at least 100 times as powerful as shale oil. Attempt is now being made to determine the constitution of a few apparently pure or almost pure compounds isolated from such tars.

Applying their standard test for determination of carcinogenicity, the staff found that olive oil, neatsfoot oil, and sperm oil were non-cancer producing and they have reason to suppose that natural skin fat is an important factor in the prevention of cancer. Thus, lanolin applications alternated with synthetic tar applications delay the development of tumors. Where lanolin is applied twice as often cancer does not appear, the protection afforded by alternate applications being much less marked.

A further line of the Committee's investigations concerns the amount of sulphuric acid required to produce detoxication of oils with a view to determining the minimal amount of acid that can safely be used to render an oil harmless.

DUST HAZARDS AND THEIR EFFECTS

ILLNESSES OF WORKINGMEN CAUSED BY THE BREATHING OF DUST. *E. Brezina. Abstr. as follows from Oesterr. Chem.-Ztg., 1930, vol. 33, pp. 39–42, in Chem. Abstr., June 10, 1930, vol. 24, p. 2814.*

A review of the subject presented as an address. No references to the literature.—P. D.

SERUM-CALCIUM IN PNEUMONOCONIOSIS. *M. J. Sokoloff and A. Cantarow. Am. Rev. Tuberc., Oct., 1930, vol. 22, pp. 449–454.*

1. In a group of thirty patients with pneumonokoniosis, fifteen of whom had an associated active tuberculous lesion, the serum calcium ranged from 7.98 to 14.81 mg. per 100 c.c., being above normal in twenty-six patients, subnormal in one, and normal in three.

2. The serum calcium level bore no relation to the incidence or activity of the complicating tuberculous process.

3. The hypercalcemia in pneumonokoniosis is in all likelihood dependent upon the increase in the carbon dioxide tension of the blood, which is an inevitable consequence of the pulmonary lesion.—*Authors' Summary.*

CEMENT DUST LUNG. *F. Schott. Abstr. as follows from Beitr. z. Klin. d. Tuberk., 1928, vol. 69, p. 43, in Am. Rev. Tuberc., Sept., 1930, vol. 22, pp. 68–69.*

Cement consists of 57 to 66 per cent. lime, 2 to 4 per cent. infusorial earth, 19 to 26 per cent. silicic acid, and 4 to 10 per cent. iron oxide, and the mesh of cement dust is about 0.06 mm. Inhalation experiments in rabbits revealed that the cement dust is taken up in the lungs by phagocytic cells similar to those acting on coal dust, and in distinction to silicic acid dust there was only a mild tendency toward inflammation. Among 100 cement workers there were twenty-one cases of pneumonokoniosis, seven with the hilum form and increased radiating strands, and fourteen with the pulmonary form. Most of the workers had served for more than ten years and in none of the 100 cases was there one with open tuberculosis, but in ten there were shadows in the upper lobe of the cirrhotic type. It is concluded that cement inhalation does not predispose to tuberculosis, nor does it tend to cause a breaking down of a healed case.

WORK ON MARBLE IN THE QUARRIES AND WORKSHOPS OF CARRARA. *M. Mazzitelli. Méd. du travail, July, 1930, pp. 173–175.*

The marble industry of Carrara employs 13,000 men. The workers do not suffer in any particular way, and certainly not from tuberculosis. Carrara marble is a pure carbonate of calcium, free from any silica. Its dust when inhaled is absorbed or eliminated harmlessly; it does not originate any pneumonokoniosis. Mortality from tuberculosis is no higher among the marble workers than among the women or other males; it may even be favorably affected by marble dust.—E. L. C.

HISTOCHEMICAL RESEARCH ON MINERAL PARTICLES IN THE LUNGS OF COAL MINERS. *A. Policard and J.*

Devuns. Compt. rend. Acad. d. sc., April 23, 1930, vol. 190, pp. 979–980.

The author reports having examined seven lungs from coal miners. Four were obtained from miners who died accidentally; nevertheless they were anthracotic. Three others came from miners who died of heart disease following upon pulmonary fibrosis; they were fibrotic, but showed less anthracosis. All the lungs contained a considerable number of mineral particles. Some of these particles represented coal dust, and others dust arising from the rocks lying between the beds of coal. The relative amount of the two types of dust varied according to the dust inhaled. The presence of rock dust in all the cases suggests that any distinction between anthracosis and silicosis cannot be established.—E. L. C.

Some Impressions of the International Conference on Silicosis, Held at Johannesburg, August, 1930. *A. J. Hall. Lancet, Sept. 20, 1930, vol. 2, pp. 655–658.*

A short summary is given of an international conference on silicosis held at Johannesburg in August, 1930, to which representatives from various countries were invited. Discussions were divided into three groups: (1) preventive, (2) clinical and pathologic, and (3) prognosis, compensation, and after care. The work carried on in the Medical Research Institute by the Medical Bureau was investigated; here every year 30,000 examinations of white miners are made and X-rays taken. Each case is reviewed by a board of clinicians sitting together. Here also in the laboratories an immense amount of pathologic material is examined. Native miners do not usually stay in the mines to be exposed to a silica hazard for more than one year; their medical supervision is simpler; but care is taken to eliminate the tuberculous. A standard means of measuring dust present in air should be adopted. The vaue of both general and localized ventilation to carry off dust was recognized; water spray by increasing humidity may add a risk from concomitant bacillary infection.

Clinical and pathologic discussions will be fully set forth in the report of the conference which is shortly to be issued, and will deal particularly with the relation between silicosis and tuberculosis. The existence of pneumonokonioses, other than silicosis, was recognized, as was also the need for their investigation. Once initiated, silicosis is progressive and is not stopped by cessation of exposure to risk; the prognosis is worse in so far as it is associated with tuberculosis. The disease incapacitates and so establishes a right to compensation; those affected should be withdrawn from risk and kept free from any exposure to tuberculous infection. Further investigations are needed in almost every aspect of the dust problems.—E. L. C.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Skin Diseases. *Ann. Rep. Chief Inspect. Factories for 1929. H. M. Stationery Office, 1930.* (*Cmd. 3633.*)

We are pleased to note that in the technical branches of the inspectorate the medical personnel will be increased

from five to eight. Industrial medicine is becoming an expert science and much is demanded of those who have the privilege of controlling the health hazards of occupation. A knowledge of the number and kind of dermatoses in industry is just as important to the dermatologist as to the inspector. It helps the former to make a differential diagnosis in many a case which comes before him, and the latter to prescribe the suitable preventive measures. To be dependable, the issuing of certificates by the appointed surgeon demands, in many instances, quite a special knowledge and much consideration.

The Senior Medical Inspector of Factories, Dr. J. C. Bridge, begins his review by a very useful table of the 40 cases of anthrax, with 5 deaths, reported during the year 1929. The locality, sex, age, situation, treatment, and material producing the disease are given. East Indian wool was responsible for 14 out of 16 cases, horsehair for 3, skins and hides for 20, and possibly tanned leather for 1. The treatments adopted were serum, organic compounds of arsenic, and excision, either singly or combined. At the moment, there appears much doubt as to which is the better remedy, serum or arsenic. Feeling this difficulty, two writers, Kurotchkin and Reimann (*Jour. Infect. Dis.*, Jan., 1930), after two successful experiences with neoarsphenamine in humans, experimented upon laboratory animals. They found that neither immune serum nor the arsenical preparation was of any use in treating experimental anthrax infections in mice or rabbits; serum was also ineffective with guinea-pigs. When, however, ordinary fatal doses of anthrax bacilli were injected into pigs, at the same time as neoarsphenamine, the arsenical preparation was of distinct therapeutic value.

The number of chrome ulcerations, both of the nose and of the skin, has largely increased. This is due, Dr. Bridge says, to the large demand for the new chrome plating of goods. The regulations to be issued will, he thinks, prevent these injuries. (For these regulations, see THIS JOUR., 1930, vol. 12, pp. 314–315.)

Cancer from the industrial use of pitch and tar, paraffin, and mineral oils has not undergone much diminution. Bridge gives the number of cases as 165 with fifty fatalities. When one remembers the very long incubation period of these growths and that the dangerous nature of these substances has only been properly appreciated for a comparatively short time, it is difficult to estimate when the potential cases will all have come to light, even presuming new exposures could be rigorously excluded.

In the photolithographic trade, 7 per cent. of the employees were found to be suffering from dermatitis. In the majority of the workers it was caused by contact with chrome or chromic acid in the processes of transferring, photolithography, and lithomachine printing. Paraffin or turpentine may have been accountable for a few cases. In the stripping process, in tobacco factories, Dr. Overton found irritation of the skin fairly common. The abstracter believes this to be the first record of such a condition. Dr. Bridge suggests that its unusual frequency is due to the larger demand for this particular operation.

The number of other cases of derma-

titis increases year by year. This year they number no less than 834, and of these, 77 per cent. occurred in males. Two tables are inserted, giving the causative agents and the industries in percentages for the last five years. In the former, alkalies and oil head the list; in the latter, engineers and chemical workers.

The abstracter entirely sympathizes with the Senior Medical Inspector of Factories when he regrets that questionnaires and conferences do not elucidate the true cause of bakers' eczema. How can they, since no reliable proof has been given that in an up-to-date modern bakery either the materials as handled, or the processes as performed, have produced a dermatitis *per se*, except in very exceptional persons? The abstracter ventures to report an extraordinary example of allergy to flour, probably unique, which he has not previously published. The patient was a middle-aged woman, formerly a baker and now a confectioner. If any uncooked flour or any form of farinaceous food, rye, vita bread, etc., touched her mouth or lips, it immediately produced itching, soreness, or water blisters. Bengars food or oatmeal she can take with impunity. When she is mixing flour as in kneading, or is among flour dust, she must wear a cloth over her mouth and nose; otherwise, she has a violent attack of hay fever. If flour touches the skin of the neck or arms, it causes intense itching, and if flour gets into a cut or sore, a bleb forms. This complaint has troubled this woman all her life. When the flour is removed from the parts, all inflammation quickly subsides and her skin and mucous membranes are apparently normal.—R. P. W.

OCCUPATIONAL SKIN DISEASES FROM THE BIOLOGICAL POINT OF VIEW. *B. Bloch. Jour. State Med., July, 1930, vol. 38, pp. 373–382.*

Industrial conditions present unusually good opportunities for studying the causation of dermatoses which may result from innumerable substances. Idiosyncrasy plays an important part; the skin may have a congenital sensitivity, but it usually represents a developed sensitivity, analogous to allergy. Reaction to any substance may be tested by applying a pad soaked in a solution of it to the skin, covering with gutta-percha and allowing it to remain in contact for twenty-four hours. The amount of redness resulting, or its absence, is then noted. The skin of an eczematous patient is about seven times more reactive than a normal skin. Dermatitis may follow absorption of a substance from the digestive tract, or its intravenous injection, as well as from direct contact. Serum from an idiosyncratic person, if injected intradermally, passively sensitizes the area. Asthma and eczema may have a common origin. A simple nitrogen free substance, $C_{14}H_{18}O_3$, the active principle of the primrose plant, applied several times to normal intact skin may develop sensitivity of the whole skin to a primrose leaf.

Occupational dermatitis is, then, a specific allergic response of the skin to a substance to which it has become sensitized by contact. The sensitization of a new worker should be tested by applying a soaked pad before exposure to a known hazard. Similarly where dermatitis breaks out, the substances in use may be tested to detect the one at fault. The general public is being more and more exposed to eczematogenous products such as hair

tonics, fur dyes, and the like; the number of contacts is legion; and the causative agent often hard to detect.—E. L. C.

Occupational Dermatitis from Coal. The Photodynamic and Irritative Properties of Certain Distillation Products of Coal. *E. W. Kistiakowski. Ann. de dermat. et syph., Jan., 1930, vol. 1, pp. 63–80.*

Artificial asphalt consists of tar, anthracene oil, and pitch. The last mentioned is made up of a number of further distillates of anthracene, which come off at temperatures between 2,700° and 4,500°. The pitch made at Kieff contains acridine, anthracene, and phenanthrene. All these substances are photosensitizers. The dischargers of the vats, which contain anthracene, are the ones who suffer most. The dust settles everywhere, on the clothes and on the exposed parts of the body. In as short a time as a day the skin of the face becomes a dark red color, the eyelids swell up, and the conjunctiva becomes bloodshot. Some find the itching, smarting, and burning so intolerable that they leave this occupation. Sweating and light make all the symptoms worse, and the men betake themselves to any dark corner to get a little comfort. The face always shows the most striking picture of pigmentation, but in time the whole cutaneous surface becomes discolored. As is usual among workers in tar, the skin feels harsh and dry, and is covered with numerous comedones and acne spots; and there is thickening of the creases of the fingers. The writer of this article believes that the photodynamic chemicals to which the workers are exposed are the chief cause of these different eruptions and the striking pigmentation. Vapor or dust is inhaled, or swallowed, and gets into the lungs and stomach. It thus passes into the system and becomes sensitized by the sun.—R. P. W.

Paraffin Keratosis and Epithelioma. *F. Wise. Arch. Dermat. and Syph., Sept., 1930, vol. 22, p. 546.*

M. O., a man, aged 64, attending the Post Graduate Clinic, had been working for forty years with an oil concern, and had had his hands and forearms immersed in various kinds of mineral oils, day after day for long periods of time. He presented several dozen crusted and scaly keratoses on the hands and forearms, together with numerous telangiectases and depressed atrophic spots. On the backs of both hands and wrists were two well-developed epitheliomas which had been present for about a year. The entire picture greatly simulated an old radiodermatitis. The patient stated that other workers in the same branch of the factory were suffering from a similar dermatitis.

Itching and Dermatitis after Working with Hyacinths and Tulips. *W. R. H. Kranenburg. Méd. du travail, July, 1930, pp. 298–299.*

Industrial Cataract. *A. Elschnig. Abstr. as follows from Med. Klin., Jan., 1930, vol. 26, p. 43, in Am. Jour. Ophth., July, 1930, vol. 13, p. 660.*

The author takes up the question of occupational cataract. He considers the pathology of two types of cataracts; the first begins with posterior cortical opacities in the young glass blower, and is slowly progressive. He states that he never has had such a

case to operate. The second is the cataract in the older glass blowers, which cannot be distinguished from senile or presenile cataract. There is also further change in these eyes, due to desquamation of transparent particles on the anterior lens capsule, which he interprets as zonular lamella.

Reports on cataracts of glass blowers date back to the middle ages, but anatomic studies have only been made recently. The author has found no difference in relation to the size of the nucleus, weight of lens, or color in comparison with senile cataract, but detached zonular lamella has been found, with no apparent capsular defect. The nuclear zone seems to be replaced by swollen cells, taking a pale eosin stain irregularly. The posterior capsule showed a small amount of proliferation.

The frequency of glass blowers' cataract in the author's clinic is slightly higher than that of senile cataract. The average age of glass blowers was 57 years, and in senile cataracts the average age was 64.5 years.

The theory of ultraviolet light causing cataract has been thoroughly disproved by Braun and others in their work on rabbits. The effect of red rays seems to be definite tissue damage as proved experimentally and by histologic examination. This theory is strengthened further by the effect of X-ray and radium. The damage to the ciliary body and the change in the aqueous through the heat rays may cause typical glass blowers' cataract. The English committee came to the same conclusion in their report in 1928. Cataract as seen in the agricultural worker may be due to the radiation of the sun passing through the lower half of the lens.

CHEMICAL INJURIES OF THE EYE. *J. Sabata. Abstr. as follows from Oft. Sbornik, 1929, vol. 4, pp. 92–96, in Am. Jour. Ophth., Aug., 1930, vol. 13, p. 748.*

The author describes the injuries, their treatment and results, in 117 cases of chemical eye injuries, admitted over a period of seven years at the Brno eye clinic. Ninety-nine were injuries by various forms of lime, nine by organic acids, and nine by other substances. Great stress is laid on the immediate removal of the caustic element and of necrosed tissue, and on copious irrigation. Ointments and atropine are used in after treatment. Healing is more rapid after alkaline than after acid injury. The iris becomes involved more frequently after acid burns. Acids are not easily neutralized and cause denser corneal opacities. Sodium thiosulphate intravenously has been used recently, and seems to hasten the healing period.

EPITHELIAL HYPERPLASIA OF THE CORNEA (? EPITHELIOMA) FOLLOWING IRRITATION OF THE EYE BY FUEL DUST. *J. W. T. Thomas. Proc. Roy. Soc. Med., Jan., 1930, vol. 23, pp. 288–289 (Ophthalmology, pp. 20–21).*

The patient, a fuel worker aged 52, gave a history of fuel dust entering the right eye and immediately causing inflammation which still persisted after three and a half years. When Thomas first saw him in August, 1927, there were three separate grayish-white patches in the eye—one on the cornea, one on the inner limbus, and one on the bulbar conjunctiva. Two months later the conjunctival patch had disappeared, and the other patches had merged into one, which extended from the inner side of the cornea horizontally outward below the pupil but did

not reach the lower margin of the cornea. Two years later further extension had taken place and a growth was removed.

Thomas considers it probable that the fuel dust, which contained 6 per cent. of pitch, was an etiologic factor in the production of the growth. It is interesting to note that sixteen years previously this patient had a pitch wart on his face which was destroyed by caustics.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

STEEL PIT PROPS. *T. Ashley, S. M. Dixon, and M. A. Hogan. Safety in Mines Res. Board, Paper No. 58. H. M. Stationery Office, 1930.*

Much attention is being devoted at the present time to the question of substituting steel for timber in the underground workings of coal mines. The value of steel arches for roadway support has been proved beyond doubt, but it is not so widely appreciated that steel props have been successful at the face, under a variety of conditions, when the prop tried has been of a suitable type.

Colliery managers who are intending to give steel props a trial will find useful information in a report on about thirteen different types, rigid and yielding, just published by the Safety in Mines Research Board.

The Support of Workings in Mines Committee, in its survey of colliery practice throughout the country, has investigated the use of steel props and recorded experience at a number of mines. The present report combines these records with information obtained from mechanical tests of the props made on behalf of the Committee at the City and Guilds (Engineering) College, and a general discussion of the conclusions to be drawn from the underground experience and the laboratory tests. The report contains sketches of the props and load shortening curves for the yielding types, together with plans illustrating the systems of roof support by steel props adopted at a number of collieries.

In an introductory note the chairman of the Committee points out that a particular steel prop may be condemned at one pit while meeting with a full measure of success at another, and it is most important that the type of prop should be carefully chosen to suit the conditions obtaining where it is to be used.—E. L. C.

EIGHTH ANNUAL REPORT OF THE SAFETY IN MINES RESEARCH BOARD AND THE HEALTH ADVISORY COMMITTEE FOR 1929. *H. M. Stationery Office, 1930.*

Reference is made to the progress of research in various directions, particularly concerning explosions and accident prevention. Rapid blows from a pick on hard sandstone may produce a yellow flash of sparks which can ignite gas; such blows are avoidable. Some agents, such as carbon dioxide and traces of iodine, raise the ignition temperature of methane. Rescue apparatus and mine ventilation received attention.

On the health side, dust problems were investigated, including the effect of slate dust on the lungs and the incidence of silicosis in the granite industry. Dust in many coal mines is

proving to be injurious and to be originating silicosis. Hematite dust has been found to be injurious to health. Dust traps for use with pneumatic drills are being brought into use. Tannic acid for first aid treatment of burns is being introduced at rescue stations. The influences of environmental conditions upon sickness and of various factors upon absenteeism are under inquiry.—E. L. C.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

BLOOD PRESSURE IN SIX THOUSAND PRISONERS AND FOUR HUNDRED PRISON GUARDS. A STATISTICAL ANALYSIS. *W. C. Alvarez and L. L. Stanley. Arch. Int. Med., July, 1930, vol. 46, pp. 17–39.*

There is need for more knowledge about biologic variations in blood pressure in groups of men and women chosen at random from the nation.

In the prisoners studied, modal blood pressure varies but little from youth to old age. Mean pressure does not increase until after the age of 40 years. In the years from 20 to 40 the percentage of men with pressures higher than 140 mm. of mercury remains almost constant. This suggests that all those who have hypertension at the age of 40 had it at the age of 20. The percentage distribution polygons show that the lower limit of normal pressure is about 90 mm., whereas the upper limit is about 140 mm.

The modal or most typical pressure is the one which should be studied when one wants to know what normal blood pressure is. In the prisoners it is about 115 mm. of mercury. This is lower than the figure usually found for men out in the world. The reason may be that the prisoners are not fatigued and worried by the struggle to make a living; to a certain extent their pressures are basal.

It appears from this study that a pressure of 115 mm. is just as normal and a pressure of 140 mm. is just as abnormal in an old man as in a young one.

After the age of 35 years, fatness tends to increase blood pressure and thinness tends to decrease it.

The older Mexican prisoners rarely show the increase in blood pressure which is seen so commonly in natives and residents of the United States. In the older negroes, however, this increase is more than usually striking. It is absent in syphilitic prisoners.

Judging from this study, the use of alcohol has no effect on blood pressure. Drug addicts appear to have slightly increased blood pressures during the years of middle life. The use of tobacco by young men appears to raise the modal pressure about 4 mm. It does not appear to produce pathologic hypertension. Cool weather slightly raises the level of mean blood pressure.

The men convicted of murder in the first degree have a mean pressure 3 $\pm$1.2 mm. higher than that of other prisoners of like ages. Strange to say, those who only attempted murder or who were convicted of second degree murder have normal pressures.

Modal diastolic pressure is 68.5 mm. in the younger men, and 73 mm. in the older men. Diastolic pressure tends to rise several years earlier than sys-

tolic pressure. As a result, pulse pressure decreases during the fourth decade of life. Fatness and leanness have a slight effect on diastolic pressure.

In middle-aged men there is a slight correlation between systolic blood pressure and weight, and also between systolic pressure and surface area. There is no correlation with height or with the degree of stockiness or ranginess. Contrary, then, to the general impression, thickset, stocky men are apparently no more likely to develop hypertension than are their tall, thin, asthenic-looking brethren.

The prison guards have pressures considerably higher than those of the prisoners. This may be due partly to overweight and partly to the fact that at the time the measurements were taken the guards were applying for a position, and many were anxious for fear something would be found to cause their rejection.—*Authors' Summary.*

CLIMATE

NINE YEARS OF SMOKE-ABATEMENT WORK AT SALT LAKE CITY. *A. Gudmundsen. Abstr. as follows from U. S. Bur. Mines, Rep. Investigations, Serial No. 3001, 1930, pp. 17, in Chem. Abstr., July 10, 1930, vol. 24, p. 3305.*

Smoke from large plants has been reduced 90 per cent. by improved plants and educated firemen and thorough rigid inspection and control. The sources of smoke are statistically considered.—P. D.

REPORT TO THE POLICE AUTHORITY ON SUPPRESSING HARMFUL SMOKE AND GAS ESCAPING FROM AUTOMOBILES. *Kohn-Abrest and Loiret. Ann. d'hyg. pub., indust. et sociale, July, 1930, vol. 8, pp. 373–410.*

Smoke and gas from chimneys or from internal combustion engines result from incomplete burning of fuel. In the case of cars the smoke arises from lubricating oil, and the gas, especially carbon monoxide, from the petrol. Any visible smoke may be taken as a sign of incomplete combustion. The relation of the amount of carbon dioxide present to the carbon monoxide is taken as the index of toxicity of the gases; the more the carbon monoxide, the higher is the index. A number of analyses of exhaust gases were made with engines running free or under load, slow or fast. The index was lowest with the engine under load at a fair pace. Details are given of these analyses in a number of tables. An appliance devised to lower the index was tried out and found quite ineffective. Trouble arises from cars when they have to go slowly or stand with the engine running in traffic; on the open road the carbon monoxide emitted is inconsiderable. Investigations made in New York are quoted in support of the data now presented. The danger in badly ventilated garages is particularly stressed.

The conclusion is drawn that much can be done to insure better combustion by attention to construction of engines and, even more, by careful use by drivers. The prohibition of visible smoke is recommended to improve matters, as the better combustion would also deal with the carbon monoxide. Information is given of a

number of analyses of air in Paris. Apart from unusual conditions, more traces of carbon monoxide were found 200 to 300 feet up than at ground level. The amount present seldom exceeded 1 part per 100,000.—E. L. C.

SULPHUR DIOXIDE IN THE AIR AT THE PITTSBURGH EXPERIMENT STATION OF THE U. S. BUREAU OF MINES. *E. G. Meiter and C. E. Traubert. U. S. Bur. Mines, Rep. Investigations, Serial No. 3005, June, 1930, pp. 5 (mimeographed).*

A total of 304 determinations of the sulphur dioxide content of the air at the Pittsburgh Experiment Station of the Bureau of Mines was made on 304 days during the period Aug. 11, 1927, to Aug. 11, 1928. The average amount found was 0.16 part per million. The maximum, 1.1 parts per million, was found on two days and less than the minimum detectable (less than 0.1 part per million) on 141 days. On 134 days the concentration was between 0.1 and 0.4 part per million inclusive and on twenty-nine days the concentration was 0.5 to 1.1 parts per million.

A general observation was made that the concentration tended to be higher on foggy or smoky days. Also, the concentration decreased with increase in wind velocity. The direction of the wind was not found to be a significant factor in changing the concentration.—*Authors' Summary.*

SUNLIGHT, NATURAL AND SYNTHETIC. *C. E. Greider and A. C. Downes. Abstr. as follows from Tr. Illumin. Engin. Soc., 1930, vol. 25, pp. 378–396, in Chem. Abstr., July 10, 1930, vol. 24, p. 3182.*

By use of a quartz spectroradiometer and thermopile with calibrated transmission screens, solar radiation energy curves were determined throughout ultraviolet, visible, and infra-red. Comparative measurements were made for carbon arcs cored with cerium or rare earth salts. Reflector design for use with these arcs was also investigated.—P. D.

AN ULTRA-VIOLET LIGHT METER. *H. C. Rentschler. Abstr. as follows from Tr. Illumin. Engin. Soc., 1930, vol. 25, pp. 406–410, in Chem. Abstr., July 10, 1930, vol. 24, p. 3182.*

A portable ultraviolet meter utilizing a glow relay tube and special U photoelectric cell is described and illustrated.—P. D.

INDUSTRIAL ENVIRONMENTAL CONDITIONS

EFFECT OF RADIANT ENERGY ON THE SKIN TEMPERATURES OF A GROUP OF STEEL WORKERS. *J. J. Bloomfield, J. E. Ives, and R. H. Britten. U. S. Pub. Health Rep., May 2, 1930, vol. 45, pp. 997–1008 (Reprint No. 1370).*

This is the first part of a study of the influence of environmental conditions upon the incidence of respiratory diseases among steel workers. It deals largely with thermoelectric instruments, with methods used for measuring radiant energy from blast furnaces, and with skin temperatures of workers exposed to the radiant heat.

Marked rises in skin temperatures were observed at the end of the casting period, the forehead and cheeks show-

ing the greatest rise. Even when the air temperature was as low as 33°F. the cheek temperature of the first helper, in a blast-furnace cast house, rose from 68.2°F. before casting to 107.6°F. immediately after casting. With higher air temperatures, still higher cheek temperatures were recorded.

The skin temperatures of workers not exposed to radiant heat followed the effective temperature index.

In a future paper the authors hope to show probable correlations between environmental conditions and sickness rates, primarily pneumonia. This information will be awaited with great interest.—C. P. Y.

THE HEAT RETAINING PROPERTIES OF CLOTHING MATERIALS. *W. Bachmann. Arch. f. Hyg., April–May, 1930, vol. 103, pp. 336–348.*

By means of a special kata-thermometer, which had a bulb larger than that of the standard kata, the author studied the heat retaining properties of clothing materials at various air temperatures and wind velocities.

In still air, a linear relationship was found between the thickness of the various fabrics and their heat retaining qualities. In moving air of constant temperature, the heat given off by the fabrics was directly proportional to the square root of the velocity. Such a general relationship held whether the fabrics were dry or damp. For the higher range of velocities (6.75 to 7.29 meters per second) the ratio of the difference between the heat loss from the unclothed and the clothed kata to the square root of the thickness of the fabrics remained constant. Charts illustrate the various relationships.—M. G. P.

SIMULATING SUNLIGHT—A NEW ERA OF ARTIFICIAL LIGHTING. *M. Luckiesh. Abstr. as follows from Tr. Illumin. Engin. Soc., 1930, vol. 25, pp. 397–405, in Chem. Abstr., July 10, 1930, vol. 24, p. 3182.*

The health giving properties of ultraviolet light from the sun are considered and artificial sunlight sources are reviewed with special emphasis on a W filament-mercury-vapor arc lamp. —P. D.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

TESTS OF MECHANICAL ABILITY. *F. M. Earle and A. Macrae. Nat. Inst. Indust. Psychol., Rep. No. 3, 1930, pp. 42.*

In this report the results obtained from the use of an assembling test of mechanical ability have been examined, and the figures obtained for groups of different age and experience are recorded. Success in the test is apparently influenced by at least three factors: the general intelligence factor, a factor of spatial perception, and a factor of manual dexterity. These factors operate in varying degrees, so that the conclusions to be drawn from an individual's success in the test can only be applied in situations which demand similar combined responses. They cannot be successfully applied

in situations in which one or other of the component factors is disproportionately present. The work of the fitter, which on analysis by observation appears to depend upon all three factors to an approximately equal degree, showed the highest correlation with the test (0.49). The work of the electrician, on the other hand, appears to require less of the dexterity factor, but relatively more of the general intelligence factor, and it gave a more significant correlation coefficient of 0.07. That of the smith gave a coefficient of 0.37.

It is concluded that the tests employed are most suitable for use with boys up to 15 or 16 years of age, whose training has not been specialized. It may be taken to be of broad diagnostic value in that it gives evidence of ability to deal with a practical situation in which the same factors are similarly combined. For more refined purposes it may be desirable to develop tests which measure the various factors separately, and to combine the results by weightings appropriate to the actual situation for which prognosis is desired.—H. M. V.

WEIGHT LIFTING. *S. G. Overton. Ann. Rep. Chief. Inspect. Factories for 1929. H. M. Stationery Office, 1930, pp. 99–111. (Cmd. 3633.)*

Accidents caused by the manipulation of heavy weights were investigated. Adult males claimed 866 out of 948. The highest rate occurred in the metal industries with 23.5 per 10,000 persons employed; shipbuilding had a rate of 19.5; engineering works one of 14.4; and textile industries one of 7.9. Loss of balance is liable to occur with a load equal to or greater than the body weight. In 658 out of 866 instances the size and weight of the load was not under the control of the worker. Muscular strain, generally of the back, was the common injury.

A further investigation was made in the jute and flax industries wherein some men handle bales weighing 400 pounds, which is more than twice their body weight and is equivalent per day to moving from 60 to 70 tons; but the average relation between load and body weight was about 100 per cent. Young men did the heaviest continuous lifting. Some injury to health from weight lifting was found among men and youths by medical examination. The load required of a man unaided should not exceed his own body weight; for youths over 16, for continual lifting, a 40 per cent. load should be the limit; for youths under 16 the limit should be 35 per cent. of the body weight. For average women a load of about 45 pounds is optimal for continuous carriage, with a maximum of 56 pounds, and a maximum of 65 pounds for occasional lifting.—E. L. C.

MAXIMUM CAPACITY AND AVERAGE ACHIEVEMENT. *S. Wyatt. Brit. Jour. Psychol., 1930, vol. 20, pp. 251–260.*

It is suggested that maximum achievement in industrial work under the most favorable conditions, when the operative is actuated by suitable incentives and is free from fatigue, should be used as a standard against which the depressing effects of unfavorable elements associated with conditions of work can be compared. The output over a period of five minutes was taken, and it was found

that the maximum performance of each member of a group of twenty-one women engaged in making cigarettes by hand was very consistent from day to day. For instance, in one member it varied only from 30 to 31.9, and in another from 20 to 21.8. The average rate in cigarette making was 18 to 29 per cent. less than the maximum rate, and the difference between the rates was greater in the quick than in the slow workers. The difference between the two rates varied considerably in different occupations, and ranged from 12 per cent. in rug making to 38 per cent. in tobacco weighing. The large deviations from the maximum observed in the tobacco weighers were due to the fact that they were paid on a time rate, while the other workers were paid on a piece rate.—H. M. V.

NOISE. *H. M. Vernon. Welfare Work, 1930, vol. 2, pp. 83–85.*

It is well known that very loud industrial noises, such as those experienced by riveters, may lead in the course of time to deafness and to definite injuries to the organ of hearing, but it is noticeable that in some very noisy industries, such as weaving, very few complaints are made by the workers. Inquiries in noisy industries such as nail making failed to elicit any serious objections; the few men workers who did object apparently got used to the noise after a few days. The only satisfactory proofs that noise is detrimental would be to find that the labor turnover is greater in noisy industries than in quiet ones, where the conditions of work other than noise are similar, and to find an increase in the time lost by sickness.

Objective tests of noise proved unsatisfactory. One test consisted in working through multiplication sums at top speed for four hours daily, under quiet conditions and noisy conditions on alternate days, and it was found that noises such as the blowing of whistles, banging of gongs, etc., either quickened the speed of work or had no effect on it. They caused feelings of disturbance and irritation, and by systematically noting down the strength of these subjective sensations, a useful index of noise effects was obtained. The extent of the effect depended on the type of work performed; the higher the mental faculties involved in its performance, the greater the disturbance caused by the noise. Noise appeared to exert a more adverse influence on clerical workers than upon industrial workers, probably because of the greater call of their work on the higher mental faculties.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

WORKMEN'S COMPENSATION ACT, 1925.

The accompanying table gives a list of industrial diseases included in the Third Schedule to the Act as extended by the Secretary of State's Order dated Jan. 1, 1929 (Statutory Rules and Orders, 1929, No. 2, Great Britain).

TABLE 1.—LIST OF SCHEDULED DISEASES

DESCRIPTION OF DISEASE OR INJURY	DESCRIPTION OF PROCESS[1]
Anthrax[2]	Handling of wool, hair, bristles, hides, and skins.[2]
Lead poisoning or its sequelae[2]	Any process involving the use of lead or its preparations or compounds.[2,3] Handling of lead or its preparations or compounds.
Mercury poisoning or its sequelae[2]	Any process involving the use of mercury or its preparations or compounds.[2]
Phosphorus poisoning or its sequelae[2]	Any process involving the use of phosphorus or its preparations or compounds.[2]
Arsenic poisoning or its sequelae[3]	Any process involving the use of arsenic or its preparations or compounds.[2] Handling of arsenic or its preparations or compounds.
Poisoning by benzene and its homologues, or the sequelae	Handling benzene or any of its homologues, or any process in the manufacture or involving the use thereof.
Poisoning by nitro and amido derivatives of benzene and its homologues (trinitrotoluene, aniline and others), or the sequelae	Handling any nitro or amido derivative of benzene or any of its homologues, or any process in the manufacture or involving the use thereof.
Poisoning by dinitrophenol or its sequelae	Handling dinitrophenol, or any process in the manufacture or involving the use thereof.
Poisoning by nitrous fumes or its sequelae	Any process in which nitrous fumes are evolved.
Dope poisoning (that is, poisoning by any substance used as or in conjunction with a solvent for acetate of cellulose) or its sequelae	Any process in the manufacture of aircraft.
Poisoning by tetrachlorethane or its sequelae	Any process in the manufacture or involving the use of tetrachlorethane.
Poisoning by carbon bisulphide or its sequelae	Any process involving the use of carbon bisulphide or its preparations or compounds.
Poisoning by nickel carbonyl or its sequelae	Any process in which nickel carbonyl gas is evolved.
Poisoning by *Gonioma kamassi* (African boxwood) or its sequelae	Any process in the manufacture of articles from *Gonioma kamassi* (African boxwood).

[1] It should be noted that a workman suffering from one of the diseases mentioned in the first column is not debarred from claiming compensation merely because he was not employed in a process set out in the second column opposite the disease. The mention of a process in the second column merely establishes a presumption that where a workman was employed in that process at or immediately before the time of disablement the disease was due to the nature of that employment unless the surgeon certifies, or the employer proves, to the contrary. In other cases the onus of proving that the disease is due to the nature of the employment is upon the workman.

[2] These diseases and processes are included in the Schedule to the Act. The others have been added by the Secretary of State's Order.

[3] In industries for which there are regulations directed against lead poisoning which require periodic medical examinations of the persons employed in certain specified processes, this item in the Schedule includes only the processes so specified.

J. I. H.
Dec., 1930

TABLE 1.—*Concluded*

DESCRIPTION OF DISEASE OR INJURY	DESCRIPTION OF PROCESS[1]
Manganese poisoning	Handling of manganese or substances containing manganese.
Dermatitis produced by dust or liquids	.....
Ulceration of the skin produced by dust or liquids	.....
Ulceration of the mucous membrane of the nose or mouth produced by dust	.....
Epitheliomatous cancer or ulceration of the skin due to tar, pitch, bitumen, mineral oil or paraffin, or any compound, product, or residue of any of these substances	Handling or use of tar, pitch, bitumen, mineral oil or paraffin, or any compound, product, or residue of any of these substances.
Ulceration of the corneal surface of the eye, due to tar, pitch, bitumen, mineral oil or paraffin, or any compound, product, or residue of any of these substances	Handling or use of tar, pitch, bitumen, mineral oil or paraffin, or any compound, product, or residue of any of these substances.
Chrome ulceration or its sequelae	Any process involving the use of chromic acid or bichromate of ammonium, potassium, or sodium, or their preparations.
Scrotal epithelioma (chimney sweeps' cancer)	Chimney sweeping.
Compressed air illness or its sequelae	Any process carried on in compressed air.
Cataract in glassworkers	Any process in the manufacture of glass involving exposure to the glare of molten glass.
Cataract caused by exposure to rays from molten or red hot metal	Any process in the manufacture of iron or steel normally involving exposure to rays from molten or red hot metal.
Ankylostomiasis[2]	Mining.[2]
The disease known as miners' nystagmus, whether occurring in miners or others, and whether the symptom of oscillation of the eyeballs be present or not	Mining.
Subcutaneous cellulitis of the hand (beat hand)	Mining.
Subcutaneous cellulitis or acute bursitis arising at or about the knee (beat knee)	Mining.
Subcutaneous cellulitis or acute bursitis over the elbow (beat elbow)	Mining.
Inflammation of the synovial lining of the wrist joint and tendon sheaths	Mining.
Glanders	Care of any equine animal suffering from glanders; handling the carcass of such animal.
Telegraphists' cramp	Use of telegraphic instruments.
Writers' cramp	.....
Twisters' cramp caused by twisting of cotton or woolen (including worsted) yarns	.....
Inflammation, ulceration, or malignant disease of the skin and subcutaneous tissues due to exposure to X-rays or radioactive substances	.....

MINERS' NYSTAGMUS AND COMPENSATION. *Lancet, Sept. 6, 1930, vol. 2, p. 543.*

Attention is drawn to an interesting legal case in which a miner, who had suffered from nystagmus, later obtained work not only without disclosing the fact, but after falsely declaring that he had never had the disease. The condition subsequently recurred. Under the British Compensation Act the industrial disease may be referred to any employment during the previous twelve months. In this case, at first compensation was given, but finally the false declaration was held to cover employment during the twelve months antedating the recurrence, and compensation was not allowed after appeal to the House of Lords. Such cases are only to be avoided by an elaborate system of employment records.—E. L. C.

SILICOSIS AND COMPENSATION. *Internat. Labour Office, Indust. and Labour Information, Oct. 27, 1930, vol. 36, pp. 140–141.*

The International Stone Workers' Congress held in Paris on Oct. 4, 1930, decided that silicosis, with or without tuberculous complications, resulting in loss of working capacity, should be considered as an occupational disease, and compensated as an industrial accident. The Congress recommended that other forms of pneumonokoniosis should, subject to the same conditions, also be considered as occupational diseases. Further, the opinion was expressed that, as the question has now been undergoing investigation from an international standpoint for over five years, the recommendations of the Johannesburg Conference concerning the compensation of silicosis from a medical point of view should be put into practice through the International Labour Organization with the least possible delay, and before the further research of a purely scientific nature called for by the said Conference is undertaken. —E. L. C.

TRAUMATIC NEUROSIS. *C. H. Bastin. Canadian Med. Assn. Jour., May, 1930, vol. 22, pp. 653–657.*

Bastin reviews the more outstanding features of the condition which has come to be known as "traumatic neurosis." He concludes that:

1. Traumatic neurosis is an emotional state, not dependent upon any physical disturbance but upon a number of psychologic factors, *viz.*, poor inheritance, fright, anxiety, suggestion, and culminating in an unconscious wish for unearned financial gain.
2. The patient is not a malingerer.
3. We can accomplish most by preventing the development of the condition.
4. With settlement of the claim the symptoms tend to disappear.

TANNING WELFARE ORDER, 1930. MADE IN ACCORDANCE WITH THE BRITISH FACTORY AND WORKSHOP ACTS. *Statutory Rules and Orders, No. 312. H. M. Stationery Office, 1930.*

This Order aims at securing the welfare of persons employed in the liming and tanning of raw hides and skins (including the retanning of tanned, or partially tanned, hides and skins), and processes incidental thereto. It has finally been made after the issue of a report by Sir Harold S. Morris dealing with an inquiry held into objections raised by the trade to the need for such

an Order. It is not particularly concerned with the occurrence of anthrax in tanneries.

The occupier is called upon to supply special protective clothing of suitable design for different processes. Aprons and leg coverings must afford protection against wet and damp. Leg coverings include vamps, spats, and other efficient means to prevent water from entering the uppers of the worker's footwear. Gloves must be of rubber or leather. A schedule, which includes twenty-three separate processes, indicates the protective clothing which has to be provided for each of them. Suitable accommodation for clothing taken off during working hours, separate accommodation for protective clothing, and means for drying such garments must be provided and maintained. First aid appliances including impermeable waterproof plaster must be at hand. Suitable messrooms must be established, and also facilities for washing, with a supply of clean towels, soap, and warm water. Where special risks, either of anthrax or of chrome sores, exist, the attention of the workers must be drawn to these risks.—E. L. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

SICKNESS AMONG INDUSTRIAL EMPLOYEES IN THE SECOND AND THIRD QUARTERS OF 1929. *D. K. Brundage. U. S. Pub. Health Rep., Feb. 14, 1930, vol. 45, pp. 321–323.*

In the first three months of 1929 an influenza epidemic caused an increase of 41 per cent. in the frequency of absence for more than one week on account of sickness, as compared with the same quarter of 1928 among approximately 106,000 industrial employees. Following the epidemic the incidence rate of illness in this group fell to a level about 10 per cent. below that for the second quarter of 1928. The favorable health record for the second quarter of 1929 was due to a decrease in the incidence of respiratory diseases; nonrespiratory diseases as a whole occurred at practically the same rate as in the second quarter of 1928. Of the respiratory diseases, only those affecting the pharynx and tonsils were more prevalent in the spring of 1929 than in the preceding spring.

The decline in the respiratory disease rate—greater than a seasonal decline—continued into the third quarter of 1929; sickness and nonindustrial accidents as a whole, however, occurred 5 per cent. oftener than in the third quarter of 1928. Nonindustrial injuries were 26 per cent. more frequent, and nonrespiratory diseases 8 per cent. more frequent, than in the same period of 1928. Diseases of the pharynx and tonsils occurred at the same rate in the third quarter of each of the two years, but influenza and grip declined 20 per cent. and bronchitis 14 per cent., as compared with the third quarter of 1928. The pneumonia rate increased in spite of a decline in influenza with which it usually fluctuates.

In general, the morbidity picture corresponds with the mortality record of the industrial population as shown

for 19,000,000 industrial policyholders of the Metropolitan Life Insurance Company.

SICKNESS AMONG INDUSTRIAL EMPLOYEES DURING THE LAST THREE MONTHS OF 1929. *D. K. Brundage. U. S. Pub. Health Rep., May 23, 1930, vol. 45, pp. 1203–1205 (Reprint No. 1377).*

The frequency of disability from sickness lasting more than one week was 27 per cent. lower in the fourth quarter of 1929 than in the same quarter of 1928. The respiratory group of diseases shows the greatest decrease, the rate being little more than one-half that experienced in the last quarter of 1928. This is explained by the fact that an influenza epidemic was in progress during the final month of 1928. Influenza and grip decreased 64 per cent., and pneumonia 26 per cent. from the incidence experienced in the same period of 1928. In the last three months of 1929, however, bronchitis and diseases of the pharynx and tonsils increased 13 and 9 per cent., respectively, but the incidence of tuberculosis declined 20 per cent., and the rate for respiratory diseases other than those mentioned above dropped 5 per cent. from the rate of the fourth quarter of 1928.

For nonrespiratory diseases as a whole, there was a decrease of 4 per cent. Within this group, diseases of the stomach, diarrhea and enteritis, and diseases of the skin showed the greatest declines—14 per cent. in both instances. An increase of 14 per cent. is indicated for the epidemic and endemic group of diseases, except influenza; little significance should be attached to this increase, however, on account of the small number of cases involved.

The sickness rates were computed from the reports of thirteen large industrial establishments having a combined male working force of 109,970. Only those establishments are included which reported in both years.

SUBJECT INDEX TO VOLUME XII

This is a subject index to all the reading matter in the ABSTRACTS OF THE LITERATURE OF INDUSTRIAL HYGIENE, and one should, therefore, look for the subject word. The name of the author follows the subject entry in parenthesis.

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